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# ZOE

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T S. BRANDEGEE.    WALTER E. BRYANT.    DOUGLAS H. CAMPBELL.  
ALICE EASTWOOD.    CHARLES A. KEELER.    FRANK H. VASLIT.

VOLUME IV.

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1893-4.

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SAN FRANCISCO, CALIFORNIA.



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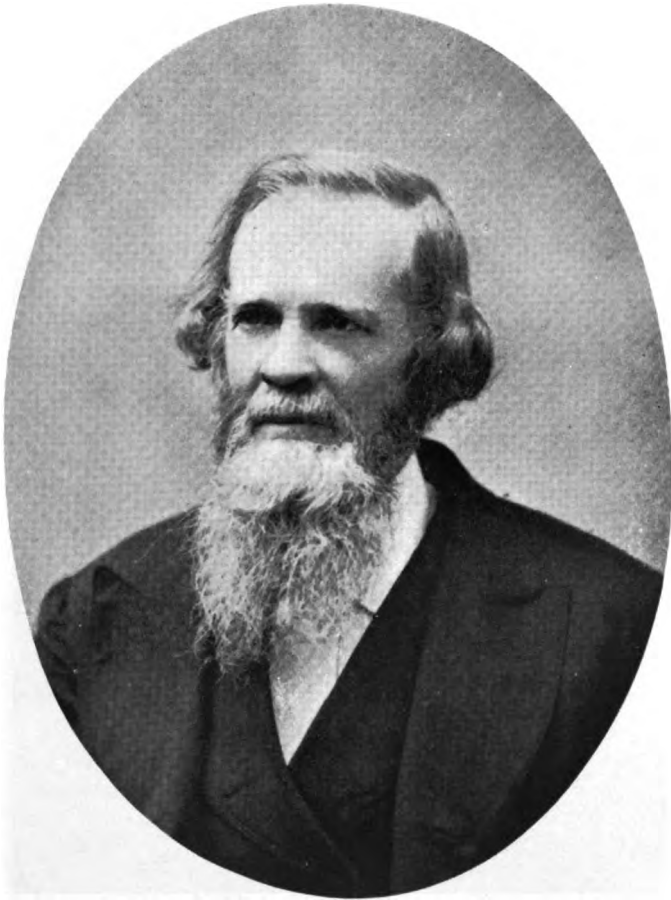
### ERRATA.

- Page 49, fourteenth line from top, for "tomentosa" read "tomentella."  
" 96, thirteenth and fourteenth lines from bottom, for "stricta" read "arvensis."  
" 99, fourth line from top, for "tomentulosa" read "leucophylla."  
" 154, eighth line from bottom, for "limosa" read "aquatilis."  
" 215, twelfth line from bottom, for "pulegioides" read "Pulegium."  
" 335 and 335, for "Pinus contorta" read "P. Murrayana."  
" 338, twenty-third line, for Negundo "Californica" read "N. Californicum."  
" 338, twenty-ninth *dele* Negundo Californicum.









*Dr. A. Kellogg*

# ZOE

## A BIOLOGICAL JOURNAL

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VOL. IV.

APRIL, 1893.

No. 1.

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### DR. ALBERT KELLOGG.

The name of Kellogg is inseparably connected with the botany of California. Coming to this State in 1849, at the age of thirty-five, he lived for nearly forty years in the midst of a rich and varied flora. He published at various times during his residence, several genera, two hundred and fifteen species,\* and several named varieties. The lapse of time and better knowledge have left valid less than sixty of these, but considering his isolation, lack of books and herbarium this proportion contrasts very favorably with the work in California of some botanical writers of much greater pretension. During the years 1877-1883 publication by the California Academy of Sciences ceased, and with the exception of a few which appeared in a San Francisco newspaper, the Rural Press, the species described by him thereafter remained in the herbarium of the California Academy of Sciences with the MS. diagnoses. Several of these, as *Eunanus angustatus*, *Sphæralcea fulva*, *Calyptridium nudum*, etc., have been described, either wholly or in part, from the types of Dr. Kellogg's unpublished species, and no mention made of his work.

He was one of a little band of seven who met at 129 Montgomery Street, in the office of L. W. Sloat, one of their number, on the fourth day of April, 1853, to found by the dim light of candles, which they had brought in their pockets, the California Academy of Sciences, now grown to proportions of which they could have hardly dreamed. When he died, March 31, 1887, he had long survived the rest.

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\* An annotated list of Dr. Kellogg's species is to be found in Bull. Cal. Acad., Vol. 1, pp. 128-151.

To the end of his life he was closely identified with the organization, which he loved with the love of a father. All visitors to the Society in the later years of his lifetime cannot fail to recall his familiar presence at the drawing-table in shirt-sleeves and red-backed vest, or, as in his hours of relaxation, leaning back in his chair with the stem of a cob pipe between his lips. He retained his sight marvelously, making to the last all his studies and drawings with a small hand lens, and finding any aid unnecessary to his reading and writing. His hair was just beginning to change from brown to gray when he died.

His personal character was above reproach; no one ever imputed to him falsehood or unfair dealing. His botanical statements, though sometimes erroneous, were true so far as he was concerned, and always made in good faith, but he was a dreamy, imaginative man, full of poetic fancies, which often in descriptions caused him to dwell unduly upon some point which caught his fancy. His habit of tracing "correspondencies" between the material world and its organisms and the mental states of man, often appeared in his botanical writings. The first description of "*Marah*," for instance, was followed by a small sermon on the "bitter waters" of affliction, and to the type of *Quercus Morehus* is appended the following note:

"Abram's Oak named from the circumstance of Abram's first encampment in the oak groves of Moreh, on his journey to Egypt (Egypt in correspondential language signifies Natural Sciences)."

His childlike enthusiasm and unworldliness impressed all who met him. He asked of the world only the means of simplest living. He lived a happy life and died respected. Would there were more like him.

## NOTES ON SOME COLORADO PLANTS.

BY ALICE EASTWOOD.

*RANUNCULUS ALISMÆFOLIUS* Geyer. This is described in Coulter's Manual as having leaves with entire margins. This is misleading; for they are as often dentate with scattered teeth.

*RANUNCULUS MACAULEYI* Gray. This varies on every mountain range where it has been found. It grows along the edge of

snow banks, and the buds can often be seen under the thin crust of melting snow. The flowers vary from an inch or more in diameter to a half inch or less. In the San Juan Mountains, above Silverton, it is abundant along the edge of snow banks. The leaves are three-toothed at the truncate apex and entire below; the calyx is thickly covered with soft brown wool. Specimens from the Elk Mountains, above Irwin, have the petals usually entire, but occasionally flabelliform, leaves almost orbicular and crenate nearly to the base, the silky wool dense on the calyx. The form from the La Plata Mountains has the calyx either densely or sparingly hirsute; the root leaves oblong-lanceolate; stem leaves not cleft as in the other two forms.

*RANUNCULUS GLABERRIMUS* Hook. Specimens of this from Mancos have cauline leaves entire as well as deeply 2-3-lobed, akenes plainly hispid. I have found no plants with three large blunt teeth at the apex of the leaves.

*DELPHINIUM OCCIDENTALE* Watson. This varies greatly. At Steamboat Springs, in Routt County, it is one of the commonest plants; but rarely could two plants be found with flowers colored alike. They ranged from dark blue to white, and the forms between, where the two shades mingled, were mottled and striped, one part colored blue in one flower, white in another, so infinitely varied that to collect all forms was impossible. Usually it is found at subalpine elevations and is dark blue. I have specimens from above Irwin, in the Elk Mountains, in which all parts of the flower have become blue, bract-like petals.

*AQUILEGIA ECALCARATA* Eastwood. This has been collected in Southwestern Colorado in but one limited locality, about twenty-five miles from Mancos, near the head of Johnston Cañon that forms a branch of the Mancos Cañon. It was abundant under an overarching rock that even late in August was still wet with the alkali water that oozed from it. The plants were growing in the sandy soil, loosely branching and also climbing up the rocky wall, apparently seeking moisture. The few flowers still in bloom were on stems that clung to the rock, but the plants were full of dry seed pods that indicated their earlier abundance. The pubescence is glandular and the flowers pink or white.

Mr. Alfred Wetherill, who discovered it, reports it also from Southeastern Utah in similar situations.

ARGEMONE. There seems to be doubt as to the existence of *Argemone hispida* Gray as a species, and in Colorado, if it has ever previously been collected, it has been merged into *Argemone platyceras* Link & Otto. It is excluded from both Patterson's and Oyster's check lists, but whether included under *A. platyceras* or *A. Mexicana* var. *albiflora* has not been learned. Judging from the specimens of *A. Mexicana* var. *albiflora* now in the herbarium of the California Academy of Sciences, *A. platyceras* is much nearer *A. Mexicana* var. *albiflora* than *A. hispida*. They are alike in the stem and foliage, glabrous and glaucous, except for the spines which are scattered on the stem and on the veins and margins of the leaves. The veins are also outlined with white, immature pods seem the same; the stamens differ slightly, *A. Mexicana* var. *albiflora* having broad filaments abruptly narrowed to the anther; *A. platyceras* with filaments narrower and tapering to the anthers which are longer and narrower than those of *A. Mexicana*. There is some variation in *A. platyceras* in the manner of branching, size of the pods, and number of spines. There are forms that closely resemble *A. corymbosa*, differing chiefly in having larger pods and the leaves longer, with deeper lobes and blunter at the apex.

*Argemone hispida* Gray. This is distinct from both *A. Mexicana* var. *albiflora* and *A. platyceras*, and shows so little variation that specimens from Colorado and California have no appreciable difference and agree with the original description as given in Gray's *Plantæ Fendlerianæ*. It differs most noticeably from the other two in the pale green foliage densely covered with short crimped bristles, short spines on the margins and veins of the leaves and very dense on the stems. The pod is densely covered with slender bristles of varying length, instead of the coarse, horn-like spines peculiar to the pod of *A. platyceras*. In growth *A. hispida* is more compact and the flowers are on short peduncles seeming almost sessile. The seeds of *A. platyceras* have a light-colored, prominent raphe and the coat honey-combed. *A. hispida* has the less prominent raphe of the same color as

the coat, which is less deeply pitted; the seeds are larger. The pods of *A. hispida* are ovate, and when they dehisce the segments are acuminate. In *A. platyceras* the pods are veiny and the segments acute. I have seen no intermediate forms which might connect these two that seem so different.

*ERYSIMUM ASPERUM* DC. This widely distributed species, as found on the plains, is low and stout, with pods often four inches long, numerous and perpendicular to the stem. The pods are stiff, and, projecting as they do, remind one of the spears of a Macedonian phalanx. The flowers are yellow. The variety at Silverton, in the San Juan Mountains, has the color of the flowers from pale yellow, almost white, to orange on the one hand, and through shades of pink and crimson to purple on the other. These different shades were found in one patch and seemed to indicate that the common yellow form had become mixed with a purple variety. The mountain form is more slender than the prairie plant, and the pods are ascending.

*ARABIS HOLBÆLLII* Hornem. This is one of the most puzzling of the western Cruciferæ because of its great variety of forms. If there are any plants of *A. Holbællii* with one row of seeds in each cell, wherein does it differ from *A. canescens*, which also has stellate pubescence and deflexed pods? The division, if *A. canescens* is a good species, should be thus: Pods deflexed or spreading, seeds in one row, *A. canescens*; seeds in two rows, *A. Holbællii*. If pods containing both one and two rows of seeds are found on the same plant of *A. Holbællii*, then *A. canescens* ought to be included under *A. Holbællii*. Including under *A. Holbællii* all the forms that are perennial and have pods deflexed or spreading, with two rows of seeds in each cell and pubescence generally stellate, the following forms should be described in order to make the species better understood:

1. From Mancos, Colo. Stem simple, stout, tall, thickly clothed at base with white branching hairs, but not stellate, above glabrous and glaucous; radical leaves from spatulate to oblanceolate, sparingly dentate or entire; cauline leaves sagittate-clasping, pedicels spreading upwards and outwards, pods deflexed or horizontal, glabrous; winged seeds, two rows in each cell, petals twice as long as the stamens, erect.



2. From Mancos. Similar to No. 1, but canescent with close stellate pubescence; pedicels strictly deflexed with scattered stellate hairs, pods sparingly hairy along the margins. This was also collected in Navajo Cañon, a branch of Mancos Cañon.

3. From Mancos. Stems slender, several from the root, canescent with close stellate pubescence; radical leaves from spatulate-dentate to oblanceolate, entire; upper part of the stem and pods smooth and glossy, pods on spreading pedicels, two rows of winged seeds in each cell, flowers small.

4. From Mancos. Similar to No. 2. except that the cauline leaves are oblanceolate, sessile at the lower part of the stem, and sagittate above only.

5. From Southeastern Utah. This branches at the root and also above, and is chiefly distinguished by the short spreading pods not more than an inch in length.

6. From Central City, Colo. This branches from near the base with many slender stems, small lanceolate sessile leaves, with scattered bristly hairs on the margins.

*ARENARIA FENDLERI* Gray. This is found at Grand Junction with short leaves and straw-colored flowers.

*SIDALCEA*. This is described as having beakless carpels. The two species found in Colorado, *S. candida* and *S. malvaeflora*, have carpels decidedly beaked, wrinkled, and veiny.

*SPHÆRALCEA RIVULARIS* Torr. This has been collected with two well marked forms. The plant seen in the Uncompahgre Cañon, near Ouray, was almost a bush three feet or more tall, with many leafy stems from the root, lower leaves a foot long, slightly lobed and crenate, hispid with stellate bristles, upper stem-leaves with deeper lobes irregularly toothed; flowers nearly two inches in diameter, white and few among the large, broad leaves which thickly clothe the stem.

At Steamboat Springs, in Routt County, Colo., *Sphæralcea rivularis* is abundant on a mountain side not far from the town. This variety branches into many flowering erect stems, leaves not more than three inches long, deeply lobed into acuminate divisions which are sharply dentate or laciniate, the large rose-colored or white flowers are crowded along the almost naked peduncles.

*OXALIS CORNICULATA* L. var *STRICTA*. The common form found at Denver is slender, loosely branching upwards, leaves scattered; the alpine variety shows a modification due to environment, and becomes low and almost prostrate, leaves crowded along the short rather stout stems.

*PACHYSTINA MYRSINITES* Raf. This is described in Coulter's Manual as having green flowers. All that I have seen have purple flowers.

*MENTZELIA ALBICAULIS* Dougl. There are two varieties of this common species. One is the widely distributed form with slender stems and linear-lanceolate leaves pinnatifid into narrow, linear lobes. The other which I name var. *INTEGRIFOLIA* is low with short, stout branches, or in more favorable situations becoming a foot high, leaves ovate-lanceolate or even broadly ovate entire or rarely coarsely and remotely dentate, petals not exceeding the stamens, pubescence somewhat viscid as well as barbed. This grows on the adobe desert and blooms almost as soon as it is up. It branches from near the base, and the leaves seem long and crowded on the short stems; but on the older specimens the stems elongate and the leaves are less crowded.

*MENTZELIA MULTIFLORA* Gray. At Grand Junction this variable species was found growing on a slaty hillside. It branched diffusely from the base and above, making a globular plant like a tumble weed. The stems are white, slender and sinuous; leaves small, about an inch long and pinnately parted into narrow, linear divisions; flowers small, not an inch in diameter, yellow. Along the McElmo Creek the plants have lobed leaves from one to three inches long, stems less numerous, stouter and straighter than the preceding, flowers larger.

*MENTZELIA NUDA* Torr. & Gray. This varies in the manner of growth and size of the flowers. The Denver form is loosely branched from near the base upwards, and the flowers are large, from one and one-half to two inches in diameter, distinctly pedunculate. The form from Southwestern Colorado has an erect stem simple up to the inflorescence; the branches are usually short with the almost sessile flowers bunched at the ends; flowers about an inch in diameter.

*ANGELICA WHEELERI* Watson. This is quite common in Colorado, at middle elevations along streams. Specimens have been collected at Crested Butte, Colorado Springs, Chiann Cañon, and at Central City.

*APLOPAPPUS SPINULOSUS* DC. and *A. GRACILIS* Gray occur through Southwestern Colorado, and there seem to be intermediate forms connecting the two. *A. spinulosus* is exceedingly variable, and the forms might easily be mistaken for new species in different localities.

*ACTINELLA RICHARDSONII* Nutt. This was collected by Miss Alida P. Lansing, in South Park, agreeing with the description of the type and different from the form var. *floribunda* common in Colorado. It has a few large heads, and the stems are shorter and stouter, while the variety has a cyme of many small flowers, and leaves in almost filiform divisions.

*ACTINELLA GRANDIFLORA* Torr. & Gray. This has the involucre from densely white woolly to almost glabrous, heads from one to three inches in diameter, leaves occasionally simple and linear, more frequently few to several lobed. Stems leafy or nearly naked and scape-like.

*CNICUS ERIOCEPHALUS* Gray. A few plants collected on Mt. Hesperus, of the La Plata Range, in Southwestern Colorado, seem to approach *C. Parryi* so closely that it is uncertain under which species to place the plants. The foliage is nearly glabrous, the involucre bracts have no lacerate fimbriate tips, the woolly hairs on the bracts are not dense, the flowers are light pink and in an erect glomerule.

*CNICUS DRUMMONDII* Gray var. *BIPINNATUS* n. var. This is either a variety of *C. Drummondii* or a new species. At present it seems better to consider it in the former light, and give the characters which distinguish it from the type of the species. Stems several from the root, two feet or more high, sparingly tomentose along the stem and the margins of the leaves; leaves divided into many linear lanceolate divisions that are themselves parted into similar lobes of variable length, the lower lobes often as long as the leaflet; the lobes are linear and about one-fourth inch

wide, one to three inches long; heads small and narrowly oblong; lower bracts of the involucre with weak prickles, upper ones purplish, acuminate and tipped with a weak point, scarious; flowers much exserted, heads several at the ends of the leafy, spreading branches.

**FRAXINUS ANOMALA Torr.** In this queer ash the leaves are nearly always simple and entire, the three-lobed or divided ones being rare. It is found at Grand Junction and on Mesa Verde, in Colorado, and through Southeastern Utah.

**PHACELIA SPLENDENS n. sp.** Annual, erect, about a foot high, usually simple stemmed, sometimes branching from near the base; stems purplish, glandular or glabrous; leaves ovate-lanceolate in outline, pinnately parted into three or four pairs of alternate divisions that are either crenate or bluntly lobed and oblique at base, nearly glabrous, but glandular on the rhachis; scorpioid cyme with a long naked peduncle; flowers on short pedicels; calyx white-hirsute, and slightly glandular, divisions linear-lanceolate, 1 mm. wide, 4 to 6 mm. long, veiny in age, with longitudinal nerves, slightly surpassing the ripe capsule; corolla bright blue, rarely white, about 1 cm. in diameter, divisions obtuse; stamens and style conspicuously exserted, 7 or 8 mm. beyond the corolla; capsule veiny, glandular, and hirsute; seeds with the central ridge very prominent, cymbiform, favose over the whole surface, but not corrugated. This beautiful *Phacelia* belongs to the *Euphacelia*, near *P. glandulosa* and *P. Neo-Mexicana*. It grows on the adobe desert soil, and while not along the edges of irrigating ditches or washes, it was comparatively near by.

Collected at Grand Junction, May, 1892.

**PENTSTEMON MOFFATII n. sp.** Stems several from the root from one to two feet high, erect, scabrous below, glandular hirsute above; radical leaves crowded, ovate-spatulate, entire, decurrent along the petioles which equal or surpass the blade in length; lower cauline leaves spatulate with long, broad petioles which are connate-clasping; upper, ovate-lanceolate, closely sessile by a cordate base obscurely dentate at the apex or entire; thyrsus interrupted, the many-flowered clusters about an inch apart;

calyx of linear-lanceolate divisions hirsute, glandular, and ciliate with crimped hairs; corolla purplish blue, hardly bilabiate, spreading lobes orbicular; two of the stamens inserted at the base, the other two half way up the limb, nearly on a line with the sterile filament which is moderately bearded down the side with hairs pointing downwards. In the descriptions of *Penstemons* no attention has been paid to the insertion of the filaments which may prove of use in determining species that seem closely related. This belongs to the *Genuini* and is nearest *P. albidus* of which it may prove to be a variety. It differs from *P. albidus* in being less glandular, the shape and attachment of the leaves, the more interrupted inflorescence, the color and shape of the corolla, the denser beard of the sterile filament and in the explanate anthers which in *P. albidus* are orbicular and in *P. Moffatii*, oblong. It was collected at Grand Junction along the railroad to the coal beds, and I have named it in honor of David H. Moffat, ex-President of the D. & R. G. R. R., whose courtesy and kindness I wish to acknowledge.

*ABRONIA TURBINATA* Watson. This varies in the fruit, the wings in some specimens being well developed; in others, more or less aborted.

*ATRIPLEX CORRUGATA* Watson. This was collected at Grand Junction, in May, 1892, with both monœcious and dioecious plants. The plants collected the previous season from which the description was made were all dioecious.

*ERIOGONUM BREVICAULE* Nutt. This is the plant which Nuttall named *E. campanulatum*, but which with *E. micranthum* Nutt. Dr. Gray reduced to *E. brevicaule*. He says that these three species are not permanently distinguishable even as varieties. The descriptions omit the most striking feature of the flower, the urn-shaped perianth, constricted at the throat and angled along the sides. All the flowers examined on the Grand Junction plants have perfect flowers.

*ERIOGONUM GLANDULOSUM* Nutt. This has been but rarely collected, and the description is imperfect. My specimens agree with Nuttall's description of *Oxytheca glandulosa* under which

name it was first described. The following characteristics not given in Nuttall's description, seem worthy of note: The bracts within the involucre which in *Eriogona* generally are so small as to be seldom noticed, in this species are larger than the teeth of the involucre, which therefore seems to be double; the capillary branchlets are geniculate about the middle, usually bending towards their axis. It is rare at Grand Junction, but was common on a hill-side in Montezuma Cañon in Southeastern Utah.

*ERIOGONUM SALSUGINOSUM* Hook. There are two forms of this that are strikingly unlike, but specimens with peculiarities of both are to be found on the same plant. One has the involucre sessile in the axils of the leaves or the forks of the stem and appears close and compact; the other has the heads at the ends of hair-like peduncles of from one to three inches long; the sessile heads are often found as well as the long pedunculate ones on these specimens which usually have narrower leaves than the first form. The pedicels are generally purple and often the whole plant has the same color. Found at Grand Junction and along McElmo Creek, in Colorado. It also grew on rocky, rounded hills in company with *E. glandulosum* and *E. divaricatum*, in Montezuma Cañon, in Southeastern Utah.

*ERIOGONUM MICROTHECUM* Nutt. The varieties of this species are puzzling, for it seems hard to know where and how to draw the line between it and *E. corymbosum* Benth. The flowers of the two species and their varieties differ so little as to furnish obscure distinguishing marks. The chief marks of difference are in the manner of growth and flowering. It seems best to arrange them in this way until more material can be obtained.

The type and the variety *effusum* have been sufficiently described; but there is a variety on the mesas at Durango, which seems to be undescribed. I propose to name it var. *RIGIDUM* because of its stiff manner of branching and flowering. Stems woody, one to two feet tall, branching from the base and also above, with erect branches tomentose throughout; leaves narrow, linear, revolute, numerous along the stem, about 2 cm. long;



corymbs umbel-like, small and compact on naked peduncles from 2 to 8 cm. long; the branchlets are usually perpendicular to the axis and the involucre are sessile, perpendicular, erect, and second on the upper side.

**ERIOGONUM CORYMBOSUM** Benth. Leaves from narrowly linear 5 mm. wide to oblong 2 cm. wide, crenate-undulate on the margins and densely white-tomentose on the under surface. The leaves are either clustered near the root or are along the stem to the long, naked peduncle of the corymb, which is usually spreading but sometimes almost capitate. The stems, branches, and branchlets are densely tomentose and seem coarse compared with the var. *leptophyllum*. This variety has long, linear-lanceolate leaves with revolute margins, somewhat tomentose below, almost glabrous above, corymbs on naked peduncles, barely surpassing the leaves, loosely branched, sparingly flowered. The species is usually found on slaty hill-sides, while the variety is found in loose soil under the pifions and cedars or along the banks of dry alkali streams. It is uncertain whether the variety belongs to *E. corymbosum* or to *E. microthecum*.

**SMILACINA STELLATA** Desf. This is described as having blue-black berries. All that have been seen in Colorado, from observations extending over several years, have the berries at first green, striped with red, but when fully ripe they are red all over. The species in California has been collected with the red-striped berries. Doubtless, if collected or observed later in the season, the berries would be found as in Colorado.

**FRITILLARIA ATROPURPUREA** Nutt. This was collected at Mancos with both perfect and staminate flowers, showing a tendency to become dioecious. No pistillate flowers were found.

**CALOCHORTUS NUTTALLII** Torr & Gray. This usually has white petals, but at Grand Junction it varies through all the shades of pink to crimson-purple and also white. *C. Gunnisoni* shades through the blue shades to the bluish-purple and white.

A NEW TRYPETID FROM CHACALTIANGUIS, MEXICO,  
WITH A NOTE ON HEXACHÆTA AMABILIS LW.

BY C. H. TYLER TOWNSEND.

The following trypetid was collected by the writer, December 31, 1892, at Chacaltianguis, a river town about seventy-two Mexican miles up the Papaloapam River from Tlacotalpam. It was taken with other diptera and various insects, by sweeping the undergrowth in the edge of the woods back of the town.

This trypetid belongs, by the markings of its wings, in the genus *Euaresta*. It has four bristles on the scutellum, which does not, however, preclude it from this genus, as some of the species placed here by Loew also possess four scutellar bristles. But the shape of the wings is distinctly different from that of the wings of *Euaresta*. They are very broad on the median one-half of their length, then slightly taper to a blunt apex. I shall leave the form for the present, however, in *Euaresta*. The species is very similar to *E. Mexicana* Wd. and *E. melanogastra* Lw. (syn. of preceding ?) but differs from both in having four bristles on the scutellum; and it also differs from all the species of *Euaresta* in another character which must be mentioned, and which was considered by Loew of generic importance, that of the third longitudinal vein being bristly almost to its termination.

*EUARESTA LATIPENNIS* nov. sp. ♀.

Front more than one-third width of head posteriorly, evenly narrowed to about one-third width of head at base of antennæ, pale silvery on borders, the rest being taken up with the wide, very dilute tawny frontal vitta, which also has a silvery reflection. Antennæ very dilute tawny, third joint about one and one-half times as long as second, second joint with a small bristle anteriorly and sparsely clothed with minute bristles; arista thickened basally, where it is concolorous with antennæ, and shows a basal joint, blackish on remaining portion. Eyes (in dry specimen) dark green, or dull purple, according to change of light. Frontal bristles five in number on each side, not including the long posteriorly directed pair on vertex; of these the anterior

three on each side are nearly straight and directed forward, while the hinder two are curved and directed backward. A pair of curved, divergent, anteriorly directed ocellar bristles. Face and palpi pale silvery, the palpi sparsely clothed with small bristles on lower portion; cheeks, occiput, and proboscis dilute tawny, occiput above bordered with a row of whitish bristles. Thorax slightly silvery cinereous, with three golden brown vittæ, clothed with whitish bristles and hairs; humeri and pleuræ concolorous; scutellum nearly concolorous, rather triangular in shape, with four bristles, the anterior pair longest, the apical pair hardly decussate. Abdomen brownish, flattened, curved under, somewhat ovate in outline, rather pointed behind, quite sparsely clothed with short bristly hairs, and with longer bristles on hind margins of segments. Legs pale brownish fulvous, claws short and blackish. Wings broad, rather long, from apical three-fourth tapering almost equally on anterior and posterior borders to a blunt apex. Picture of wings almost the same as that of *E. Mexicana*, figured by Loew in Monographs, iii, pl. x, fig. 28. Differs from the figure only as follows: Second vein ends about in middle of margin of hyaline spot third from tip on anterior border; of the three marginal hyaline spots of second posterior cell, the two end ones are somewhat elongated inward like the middle one; the proximal one of the two costal hyaline markings in marginal cell does not extend inward below the second longitudinal vein, or is represented by only the merest dot, and the distal one does not quite reach second vein; one (the right) wing shows two hyaline drops about middle of discal cell, the distal one smaller, while in the other wing the smaller distal drop is represented by two very small dots in a line transverse to the wing; five hyaline drops in third posterior cell, two bordering on posterior margin of wing, two approximated to fifth-vein, and one bordering on the sixth (anal) vein considerably removed from the margin; four obscure hyaline drops in the less infuscated anal angle of the wing, inside the anal or sixth vein; the coloring becomes more or less dissolved toward the wing base, the second basal cell being mostly clouded on distal half. Third vein bristly to a point about opposite or a little beyond termination of second vein, first vein bristly nearly

all of its length. The markings of the wings are nearly black, or brownish black. Halteres pale tawny, knob pale lemon yellow.

Length (with abdomen curved under), hardly 3 mm.; of wing,  $3\frac{1}{2}$  mm.

It is quite probable that a separate genus will have to be created for this form, at some future time, based on the shape of the wings, the bristly third vein, and the four bristles of the scutellum.

NOTE ON *HEXACHÆTA AMABILIS* Lw. A single specimen of this most handsomely marked trypetid was taken with the preceding at Chacaltianguis, December 31, on foliage of plants in the edge of the woods. The species of the family Trypetidæ are remarkable for their handsome markings, but this species, while possessing no other colors than black, dilute brown, and two shades of yellow, is one of the most beautifully marked species of this beautifully marked family.

The markings of the wing in this specimen are of a deep shining black. Loew does not mention the hyaline drop in proximal end of distal cell, or leaves it to be implied when he likens the pattern to that of *H. eximia*. According to Macquart's figure of the latter (Dipt. Exot. Sup. 4, pl. 27, fig. 3), and allowing for the modification in Loew's text, I would not call the pattern of *H. amabilis* at all similar to that of *H. eximia*. Loew's description of the wing pattern agrees perfectly in nearly every detail with the present specimen. He described only the ♂. The present specimen is a ♀.

The middle femora in this female specimen are hardly at all black, and the hind femora are only a little black on inside and outside, the rest being all yellow; there are two patches of black on pleuræ below wing bases, these patches being separated by the longitudinal pleural vitta of sulphur yellow, the forward portion of the pleuræ dissolving into brownish fulvous. The head is pure deep lemon yellow, the eyes of a purplish red (in dry specimen); front about two-sevenths width of head, hardly narrowed anteriorly, with three black frontal bristles on each side directed forward and inward, two weaker ones behind on each side directed backward and not inward, and a pair at each

vertical angle with two short pairs between them. Ocellar bristles consisting of one extremely weak pair directed forward. The antennæ, face, front, cheeks, occiput, palpi, and proboscis are all of the pure light yellow; only the labella tinged with fulvous, the arista brownish, the ocellar spot blackish, and the bristles on head black. Claws and pulvilli just a little elongated.

Length, 6 mm.; of wing, 6 mm.

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## ADDITIONS TO THE FLORA OF COLORADO. II.

BY ALICE EASTWOOD.

1. *Lepidium campestre* R. Br. Rare along the Platte River, near Denver, July, 1892.
2. *ARABIS PULCHRA* Jones. Grand Junction.
3. *Saponaria officinale* L. Along the railroad, Denver, July, 1892.
4. *Malvastrum leptophyllum* Gray. Along McElmo Creek, June, 1892.
5. *Malva rotundifolia* L. Introduced at Denver, but not common.
6. *Erodium cicutarium* L'Her. Along the Grand River near the opening of the cañon, Denver. Not common.
7. *PSORALEA CASTOREA* Watson. Grand Junction on the mesa across the Gunnison River, May, 1892.
8. *Onobrychis sativa* L. Escaped from cultivation near Ridgway, June, 1892.
9. *ASTRAGALUS DESPERATUS* Jones. Collected at Grand Junction and on the McElmo Creek, Colorado, May and June, 1892.
10. *ASTRAGALUS CICADAÆ* Jones n. sp. Collected at Grand Junction along the railroad track that goes to the coal mine, May, 1892.
11. *ASTRAGALUS ANISUS* Jones n. sp. Collected at Pueblo by Miss Alida P. Lansing in 1892, and by the writer in poor specimens in Southwest Colorado near Mancos in 1890.

12. *ASTRAGALUS WETHERILLII* Jones n. sp. Collected along the Grand River between Grand Junction and De Beque, May, 1892.

13. *ASTRAGALUS LANCEARIUS* Gray. Collected at Mancos where it is common, June, 1892.

14. *ASTRAGALUS ASCLEPIADOIDES* Jones. This remarkable astragalus grows at Grand Junction along the railroad to the coal mine, June, 1892.

15. *ASTRAGALUS NUTTALLIANUS*, DC. Common at Grand Junction, May, 1892.

16. *ASTRAGALUS GRALLATOR* Watson. This was incorrectly reported as *A. Grayi* in Additions I, Zoe, ii, 3.

17. *ASTRAGALUS AMPHIOXYS* Gray. Common at Grand Junction and Durango, May and June.

18. *ÆNOTHERA BRACHYCARPA* Gray. This was reported as *Æ. triloba* in the article mentioned above.

19. *ÆNOTHERA CARDIOPHYLLA* Torr. Grand Junction, June, 1892.

20. *ÆNOTHERA ALYSSOIDES* Hook. & Arn. var. *MINUTIFLORA* Lindl. Grand Junction on the adobe desert, May, 1892.

21. *OPUNTIA WHIPPLEI* Eng. & Torr. Durango and Mancos on rocky hills, June, 1892.

22. *LIGUSTICUM EASTWOODÆ* Rose ined. n.sp. Common above timber line in the La Plata Mountains, August, 1892.

23. *PEUCEDANUM AMBIGUUM* Nutt. var. *LEPTOCARPUM* C. & R. This was wrongly reported in Additions I as a variety of *P. nudicaule*.

24. *Scabiosa atropurpurea* L. Escaped from cultivation at Durango, August, 1892.

25. *BRICKELLIA BRACHYPHYLLA* Gray. Mesa Verde, August, 1892.

26. *BIGELOVIA NEVADENSIS* Gray. Mesa Verde, August, 1892.

27. *TOWNSENDIA STRIGOSA* Nutt. Along McElmo Creek, June, 1892.

28. *ASTER FRONDOSUS* T. & G. Collected in South Park by Miss Alida P. Lansing.

29. *Anthemis Cotula* L. Sparingly introduced at Denver, August, 1892.

30. *Chrysanthemum Leucanthemum* L. Collected at Denver along the Platte, and at Irwin not far from timber line and near a house shattered by an avalanche.

31. *SAUSSUREA ALPINA* DC. var. *LEDEBOURI* Gray. This was collected by Miss Alida P. Lansing, near Faruham, Colo. It is much further south than ever before reported.

32. *Cichorium Intybus* L. Introduced from gardens, Denver.

33. *Tragopogon porrifolius*, L. Escaped from cultivation throughout the State.

34. *STEPHANOMERIA EXIGUA* Nutt. Grand Junction, May, 1892.

35. *LYGODESMIA EXIGUA* Gray. Grand Junction, May, 1892.

36. *AMSONIA ANGUSTIFOLIA* Michx. var. *TEXANA* Gray. Grand Junction on the mesa across the Gunnison River, May, 1892. This is very showy with its many clusters of blue flowers.

37. *PHILIBERTIA UNDULATA* Gray. Cañon City, along the Hog-Back, June, 1892.

38. *KRYNITZKIA PTEROCARYA* Gray. This is common at Grand Junction, May, 1892.

39. *AMSINCKIA TESSELLATA* Gray. Collected at Morrison by Miss Lansing.

40. *LYCIUM PALLIDUM* Miers. McElmo Creek, June, 1892.

41. *Datura Stramonium* L. At Denver, along the Burlington R. R., near Thirty-first Street.

42. *Linaria vulgaris* Mill. At Durango and in Platte Cañon, near Estabrook, August.

43. *PENSTEMON STRICTUS* Benth. Durango, July, 1891.

44. *MIMULUS RINGENS* L. Along the Platte, near Denver, July, 1892.

45. *CORDYLANTHUS RAMOSUS* Nutt. This was probably reported from Southwest Colorado as *C. Kingii*. It is found at Mancos under cedars and piñons, August, 1892.

46. *Nepeta Cataria* L. Denver, Colorado Springs, 1892.

47. *Brunella vulgaris* L. Common everywhere near water.

48. *PLANTAGO PUSILLA* Nutt. Grand Junction, May, 1892.

49. *Chenopodium urbicum* L. Evidently introduced. Along a roadside in North Denver, September, 1892.

50. *MONOLEPIS PUSILLA* Torr. Under sage brush, Grand Junction, May, 1892.

51. *Atriplex roseum*, L. Introduced at Denver. Rare.

52. *ERIOGONUM DIVARICATUM* Nutt. Grand Junction, May, 1892.

53. *ERIOGONUM GLANDULOSUM* Nutt. Rare at Grand Junction, May, 1892.

54. *ERIOGONUM BREVICAULE* Nutt. Grand Junction, May, 1892.

55. *RUMEX HYMENOSEPALUS* Torr. Grand Junction, May, 1892.

56. *ALLIUM NEVADENSE* Watson (?) Grand Junction, May, 1892.

57. *NOTHOSCORDUM STRIATUM* Kunth. Mancos and Grand Junction, May.

58. *CALOCHORTUS FLEXUOSUS* Watson. Along McElmo Creek, June, 1892.

59. *SPARGANIUM EURYCARPUM* Engelm. Along the Platte, Denver, September, 1892.

60. *SPOROBOLUS CONFUSUS* Vasey. Denver, July, 1892.

61. *Dactylis glomerata* L. Denver. Introduced.

62. *Polypogon Monspeliensis* Desf. Denver. Introduced.

63. *Eragrostis major* L. Common at Denver. Introduced.

64. *Poa brevifolia* Muhl. Denver, along a ditch. Introduced.

65. *GLYCERIA ACUTIFLORA* Torr. Denver.



66. GLYCERIA FLUITANS R. Br. Denver.
67. GLYCERIA PALLIDA Trin. Denver.
68. GLYCERIA GRANDIS Watson. Denver.
69. AGROPYRUM GLAUCUM R. & S. var. OCCIDENTALE  
V. & S. The Common Blue-Stem. Denver.
70. AGROPYRUM TENERUM Vasey. Denver.
71. *Elymus Virginicus* L. var. *submuticus* Hook. Denver.

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## RESTRICTED DISTRIBUTION OF FRESH WATER OLIGOCHÆTA.

BY GUSTAV EISEN.

The geographical distribution of fresh water oligochæta, as compared to fresh water algæ, is most interesting and unexpected. It is well known that a majority of species of fresh water algæ are cosmopolitan, and even locally widely distributed, being rarely confined to special localities, such as a single pond, spring, or lake. An alga which is found in one spring or creek is almost certain to be found in some other spring or creek in the vicinity. Many species have a world-wide distribution, while others of rare occurrence have been found in distant localities. With the fresh water oligochæta this manner of occurrence is exactly opposite. Few species are found in countries far apart. Not one species is found distributed all over the world, while by far the greatest number of species are endemic in certain districts, or even confined to certain ponds, lakes, rivers, creeks, or springs outside of which they do not appear to thrive. With the genera this, of course, does not hold good. True, Lumbrici are found the world over, but it is more than probable that whenever the same species is found in very distant countries, it has been artificially introduced there with economic or garden plants brought along by nursery men or horticulturists. The distribution of fresh water oligochæta is as yet only imperfectly known, and it is too early to compile their geographical distribution, but enough is known to warrant us to believe that there are some powerful influences in nature which operate on and curtail their

geographical distribution, which influences are not interfering with the fresh water algæ inhabiting the same localities.

Nearly all the California fresh water oligochæta which have been described to date, have been found in single ponds or springs, and have been vainly searched for elsewhere. Thus in the Mountain Lake, near San Francisco, at the Marine Hospital, several forms occur which are not found outside of that little pond, as a pond it really is. We may mention *Sutroa rostrata* and *Limnodrilus silvani* (long form) among others. In Laguna Puerca, which is only a few miles from this place, we look in vain for these species, but here another species and genus occurs, which again is found nowhere else. This genus is a new one, related to Sparganophilus, of the family *Rhinodrilidæ*. This family is an American one, still one species of Sparganophilus has lately been found and described by Benham, from a very limited spot in the River Thames, in England. Mr. Benham is convinced that the cocoons of this worm have been brought there with American plants, as the locality where the worm is found is, in reality, restricted to a few yards square. *Sutroa rostrata* is similarly restricted, it being only found in a place not over a hundred feet square in the pond mentioned above. But, if we return to our San Francisco species, we find that in Laguna Merced, not over a mile from Laguna Puerca, we look in vain for any of the species found in the two other ponds. *Sutroa alpestris* again has been, so far, only found in a few small springs around Donner Lake, in the Sierra Nevada, and I have not been able to find it elsewhere. *Telmatodrilus vejdoskyi* again has, though extensively searched for, only been found in a single meadow in the Sierra Nevada, in Fresno County. *Eclipidrilus* is another remarkable form, found in two little springs at Alpine Meadows, on the head waters of the middle-fork of King's River, in the Sierra Nevada.

*Ocnerodrilus occidentalis* has only been found in a plat of garden one hundred feet square in Fresno County, but nowhere else in California, nor have I been able to find any other species of *Ocnerodrilus* in this State. *Ocnerodrilus beddardi* occurs only in the Cape region of Baja California, but does not transgress its limits, and does not reach the main-land of Mexico, across the

Gulf of California. In Sonora I found only *Ocnerodrilus sonora*. In Central America the species were equally confined. In the vicinity of the City of Guatemala I found four distinct species of *Ocnerodrilus*, each one of which was confined either to a certain garden or to a certain creek or pond, while in parts of the country other species were found equally restricted. The *Enchytræides* are almost equally circumscribed geographically. A species of *Pachydrius* could only be found in a single little creek (Rush Creek, Fresno County) in the Sierra Nevada, and I searched for it in vain elsewhere, though small creeks abound there everywhere not one mile apart. Another gigantic *Enchytræus*, several inches long, was confined to a single little meadow on the south fork of King's River. Only one or two of the California limicolids have a wider distribution, and they are species of *Limnodrilus*, which genus shows a greater adaptability to different localities than any other. With such restricted geographical distribution it is to be expected that many interesting and aberrant oligochæta may yet be found in almost every isolated water course or pond, especially in countries where, through the division of seasons into dry and rainy, the water courses and ponds are comparatively scarce and disconnected.

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CONTRIBUTIONS TO WESTERN BOTANY. No. 4.

BY MARCUS E. JONES.

*Astragalus candidissimus* (Benth.) Wat. Probably from a woody root if not shrubby, rather tall, a foot or two high at least; stems flexuous; peduncles one and one-half times longer than the leaf, rather stout; stipules minute. Mr. Brandegee's specimens from Magdalena Island have about eight pairs of leaflets, obovate-cuneate, rounded or emarginate at apex, scarcely petiolulate, appressed silvery silky, five lines or less long; whole leaf three inches long; petiole an inch or less long; flowers, in dense spikes which are two inches long, five lines long, almost sessile, minute bract twice as long as pedicel; calyx black-hairy, two lines long, cleft deeper on the upper side, teeth short, triangular, one-half the length of the campanulate tube; pods sessile,

membranous, inflated, an inch long when fully developed, minutely pubescent, oval, apparently circular in cross-section, with a short triangular point, very slightly pointed at base, horizontal, dorsal suture scarcely evident, generally sulcate slightly dorsally, ventral suture impressed about a line deep in the middle of the pod and seed-bearing for half the length of the pod, not impressed at base or apex, deeply sulcate ventrally to about one-third the depth of the pod, seeds small, many; young pods more pointed and hoary pubescent.

Other specimens from Scammon's Lagoon, Lower California, have oblanceolate leaflets, six lines long, neither truncate nor acute, twelve to fifteen pairs; no petiole; leaf three to six inches long; calyx, bracts, and spikes the same as above; flowers light purple, sides of banner and tip of keel dark; blade of keel two and one-half lines long, bent from base of blade to the blunt tip into one-third of a circle, very short and thick; broadly lanceolate wings, little ascending and a little longer than keel; banner ovate in outline, large, curved in an arc of a circle beginning at tip of calyx teeth, apex erect, two lines longer than keel; pods inclined to be ovate and more pointed, minutely pubescent, less deeply sulcate, but otherwise the same. The heads resemble *A. adsurgens*. Manifestly allied to *A. diphyus* and *lentiginosus*, despite the one-celled pod, but nearest to *A. oocarpus*. The whole section to which this belongs, from *A. curtipes* to *A. Douglasii*, is in great need of careful and extensive field studies. I have no doubt that there are twice as many species recognized as exist. This might be *A. vestitus* as far as the description goes, for some of the flowers might be called ochroleucous if taken alone.

*Astragalus anemophilus* Greene. (Includes *A. Miguelensis* Greene.) This is very closely related to *A. candidissimus*, and may prove to be identical with it, and is quite likely to be *A. vestitus*. It differs from the former so far as the type goes in the stipules being connate opposite the petioles, and in the white-woolly pubescence. The flowers are too immature to determine what they are. The pubescence of *A. candidissimus* is woolly or tangled on the calyx, but elsewhere is of straight or slightly tangled hairs which are appressed. The leaflets of this species

are in ten to fourteen pairs, oval to elliptical, truncate to acutish, and sometimes apiculate, four lines long; petiole an inch long or none; flowers in a short and rather loose spike; pods hoary to almost glabrous; calyx two lines long, campanulate, teeth triangular and very short; pods the same as in *A. candidissimus*, also the pedicels, bracts, and peduncles. This is probably woody at base. The calyx is cleft deeper above, little gibbous, teeth nearly equal; flowers ochroleucous and ascending. Described from the type in the California Academy. Collected by E. L. Greene at Cape San Quentin, May 10, 1885. So far as the description goes, this also might be *A. vestitus*.

*Astragalus Miguelensis* Greene. Probably woody or shrubby at base; stems, peduncles, leaves, bracts, pedicels and keel the same as in *A. candidissimus*; leaflets in ten to thirteen pairs, two-thirds of an inch long or less; flowers in a dense head or very short spike; calyx short-campanulate, cleft deeper above, teeth triangular-subulate, unequal, the lower nearly the length of the tube which is one and one-half lines long; flowers inclined to be reflexed, ochroleucous; keel three lines longer than calyx teeth; wings narrowly and obliquely lanceolate, and slightly ascending, two lines longer than the keel; banner ascending in a broad arc, and tip nearly erect, oval, a line longer than the wings; pods in a dense head, an inch long, exactly those of *A. candidissimus*, but perfectly glabrous, membranous and a little stiffer than the other, striate and faintly corrugated crosswise; seeds dark and nearly round. The upper stipules are not connate, though the lower ones are. The spike and flowers remind one of *A. Canadensis*. Collected by E. L. Greene at San Miguel Island, Cal., September, 1886. As Mr. Greene has suggested, this is probably a form of *A. anemophilus*, unless there is a good character in the flowers, and I doubt that. This plant from the Herb. Cal. Acad. is ticketed in the handwriting of Mr. Greene, but differs in a marked degree from his description in Pittonia i, 33, and it differs from *A. anemophilus* more than that does from *A. candidissimus*. The pubescence is woolly but with some straight hairs in places. As the stipules vary there is really nothing but the woolly pubescence to keep *A. candidissimus*, *vestitus*, *anemophilus* and *Miguelensis* from being combined; this is, however,

a character of great weight so far as my knowledge of the genus goes, yet it may be variable in the southern and hot regions.

*Astragalus fastidiosus* (Kell.) Greene. *Phaca fastidia* Kell. Hesperian iv, 145. I doubt if this is a valid species. It is too near *A. curtipes*, and all of the species given in the Botany of California along with *A. curtipes* are founded on weak distinctions. This species is like its relatives, not only inclined to be shrubby at base but most manifestly so. The leaflets are two to six or more lines long, obovate to almost linear, obtuse or retuse, narrowed at base and about nineteen; peduncles at least six inches long; calyx teeth shorter than the tube or not longer; pod semi-ovate, narrowed but not acuminate at base, apex acuminate or rather short-pointed, incurved; stems densely white-hairy; leaves almost glabrous to white-pubescent. Described from type collected on Cedros Island, by E. L. Greene.

*Astragalus pachypus*, Greene. This most distinct and very interesting species would be referred to the *A. nudus* section if it were not almost two-celled. This frequent finding of plants that destroy all our notions of classification into *Astragalus* proper and *Phaca*, leads one to hope that the division of the pod will take a minor place, so that species that are otherwise related may be grouped together and not widely separated, as they are at present in the common methods of classification. In addition to the published description I find that the pod is very much laterally compressed and is one-celled at the apex.

*Astragalus collinus*, (Dougl.) var. *Californicus*, Gray. *A. Californicus* Greene, Bull. Cal. Acad., iii, 157. This plant reminds one forcibly of *A. Drummondi* in habit. It is erect; leaves without a petiole to speak of, two to three inches long; leaflets about ten pairs, set very close together, three-quarters of an inch long, obtuse or emarginate; peduncles about three times as long as the leaves; calyx campanulate or occasionally very shortly cylindric, tube two lines long, one and one-half lines wide, teeth one-half a line long and broadly triangular, calyx rather sparsely short-hairy, yellowish; legume vetch-like, one and one-half inches long and two and one-half lines wide, acuminate at base, on a stipe four lines long, sharply acute at

apex, and pendulous; keel exceeding the calyx teeth by two lines, wings one and one-half lines longer than keel, and banner two lines longer than wings, banner erect, wings and keel arched, broad tip of keel incurved at a right angle. Otherwise, as in *A. collinus*. Described from the type collected at Yreka, Cal., by E. L. Greene. This differs from *A. collinus* (*Phaca collina* Hooker) as described in Flora of North America, T. & G., 347, in the leaflets being closely set and not "remote," shorter, peduncle longer, calyx not "tubular" nor "elongated" but campanulate as a rule, and in the banner being much longer than the elongated wings. It differs from the description given in King's Rep., p. 444, in the pod being linear and not linear-oblong. Watson there gives the calyx as oblong-campanulate or cylindric, and the pod as an inch long. Canby, in Botanical Gazette, xii, 150, gives it as his opinion that this is only a variety of *A. collinus*. No one seems to have remarked upon the short keel and close set leaflets. If these are common to the true *A. collinus*, then, no doubt, this is a form of *A. collinus*.

*Astragalus Mogollonicus*, Greene, Torrey Bulletin viii, 97. This is only a form of *A. Bigelovii* apparently, as it is a common thing for *A. Bigelovii* to be very hirsute with yellow hairs, and the pod is from oval and short pointed to lanceolate and rather long pointed. The immature pod of this plant is straight and cylindric-lanceolate. Rusby's specimen is fully as large as *A. Bigelovii* and like it in all respects so far as can be seen, but it has no mature fruit, while Greene's specimen, the type, is very young and without fruit at all. I have a specimen of *A. mollissimus* from the same region, the San Francisco Mountains, Ariz., that, so far as the yellowness is concerned, would pass for *A. Mogollonicus* were it not for the cylindrical and perfectly glabrous pods.

*Astragalus calycosus* Torrey var. *scaposus* (Gray) *A. scaposus* Gray, Proc. Am. Acad. xii, 55. *A. candicans* Greene, Bull. Cal., Acad. i, 156. It is strange that Dr. Gray did not recognize the close relationship of this plant with *A. calycosus*. It has only the remotest resemblance to *A. Missouriensis* and no relationship to it. The true *A. scaposus* differs from *A. calycosus* only in the short and triangular calyx lobes and the less

deeply cleft wings, and longer calyx tube. It is a little more robust and with larger flowers, but I have specimens from the Buckskin Mountains, Northern Arizona, on the border of Utah, with the calyx lobes one-half as long as the tube, and not deeply cleft wings. My specimens of *A. scaposus*, named by Dr. Gray himself, show a great diversity in the lobing of the wings. Specimens from Southeastern Utah, collected by Miss Eastwood, have a short calyx and short teeth, but are otherwise as in *A. calycosus*. I have given a full description of *A. calycosus* in "Contributions No. 3," so that it is not necessary to repeat the character of the pod, which differs in no respect, when fully developed, from *A. scaposus*. I have compared the type of Mr. Greene's *A. candicans* and find that it differs in no respect from *A. scaposus*.

*Astragalus Hosackiae*, Greene, Bull. Cal. Acad. i, 157. This is a common form of *A. humistratus*. I have plenty of specimens, gathered along with the usual form of *A. humistratus*, that have the pod of *A. Hosackiae* and the general form of the leaves of *A. humistratus*. I have others with the leaves and general aspect of *A. Hosackiae*. Mr. Greene's species seems to grow in the shade, where the leaves become wider. The pod of *A. humistratus* varies greatly, being curved to a half circle or nearly straight and short; it is also a little sulcate dorsally often. The crowding of the leaflets and leaves is of common occurrence.

*Astragalus Gilensis* Greene, Torrey Bull. viii, 97. This is a very distinct and interesting plant, but belongs to the Homalobi. The keel is incurved and sharply acute, one-half a line shorter than the wings, banner one to one and one-half lines longer than wings, the keel exceeds the calyx teeth by a line only; calyx tube one and one-half lines long, narrowly campanulate equaling the subulate teeth; bracts hyaline, acuminate, lanceolate, one and one-half lines long, longer than the short pedicel; calyx contracted at base; flowers in a head which is one-half an inch long; pod flattened laterally, about two-seeded, obliquely ovate-oblong, one-celled, no intrusion of sutures, thin-chartaceous, dorsal suture about straight, ventral much arched, the pod seems to be wrong side up but it is not so, sharp pointed,



both sutures prominent externally, pod three lines long; lower stipules large and hyaline and densely imbricated; leaflets five to eight pairs two to three lines long, elliptical and appressed silky; leaves two inches long, root woody and large. This seems to be near to *A. miser*. This description is drawn from the type collected on the Gila River, by E. L. Greene. I do not attempt to give a full description, as the other characters are given by Mr. Greene.

*Astragalus insularis*, Kellogg. I do not know where this was first published. Annual or flowering the first year. The small plants have the habit of *A. Geyeri* and a remote resemblance to *A. triflorus*. Many-branched at the summit of the root and rather slender, lateral branches probably prostrate or ascending, and the central ones erect or nearly so. Flowers two lines long, keel, wings, and banner nearly equal, not curved; very campanulate or globose calyx sessile and as long as the subulate-triangular teeth, calyx and teeth scarcely over a line long in all, calyx reflexed in fruit; pods broadly ovate, sessile, membranous, one-celled and not sulcate, sutures scarcely visible, pod much inflated, about five lines long, rounded at base and with a triangular laterally flattened, sharp apex which is one or two lines long, the beak is flattened so as to be no thicker than paper in the second form given below, cross-section of pod apparently circular; peduncles one to two inches long, rather stout, shorter than the leaves, three to six-flowered, racemously and remotely on the upper half of the peduncle; leaves with three to five pairs of elliptical-linear and apiculate leaflets which occur on the upper half of the rachis or common petiole; whole plant, even to the pods, minutely pubescent. Cedros Island, collected by Dr. Veatch, 1877, June 4th. Another form, if such it be, is the upper part of a stem that may have been a foot or two long; it has seven to nine pairs of acute leaflets, six lines long, no proper petiole; leaves four inches long; peduncles two and one-half to three inches long and stout; pods globose but with the peculiar beak three lines long. Cedros Island, Dr. Veatch. This species seems to belong near *A. macrodon*. *A. Pondii* Greene, Pittonia, i, 288, is the same so far as the published description goes.

*Astragalus streptopus* Greene, Bull. Cal. Acad. i, 156. This I take to be a form of *A. Nuttallianus*. The only difference seems to be that the flowers are a little more numerous and racemose and the leaflets are often retuse. I have specimens with racemose flowers, and others with the pods wrong side up by the twisting of the pedicels, and otherwise intermediate.

*Astragalus albens* Greene, seems to be a good species but very close to *A. Nuttallianus*, though Watson places it near *A. tricarlinatus*. It would pass for a form of *A. Nuttallianus* with wider leaves and tips of pods. If this is a perennial it blooms the first year. It is prostrate or ascending, six inches or more long, many branched from the base; raceme loose; peduncles twice as long as the leaves, which are one to two inches long, petiole over one-half of the whole; keel purple tipped, very broad and blunt, longer than the wings and equaling the broad banner, two lines longer than the calyx and teeth, which are a line long, teeth equaling the campanulate tube, pedicel nearly as long as the tube; pod broadly linear, narrowed and pseudo-stipitate at the base, broadest at apex, which is sharp-pointed and triangular, laterally compressed, minutely and rather sparsely short-pubescent, not at all silky except when very young, two-celled. Described from the type.

*Astragalus Rusbyi* Greene, is a good species. I also collected it in abundant material near Flagstaff, Ariz., 1884.

*Astragalus malacus* Gray, var. *Layneæ* (Greene). *A. Layneæ* Greene, Bull. Cal. Acad. i, 157, belongs to the Micranthi. In addition to the characters given I find the flowers are purple, one-half an inch long; wings narrow, just surpassing the keel, and banner but little longer; banner ascending; keel apparently with an obtuse short beak; leaves almost oval, very villous-woolly, the hairs very fine, not much tangled in the type but much so in Parish's specimens, attached by the small pustulate base, the leaflets in the Mrs. Curran specimens are obovate; the flowers seem to be reflexed and the pods erect; calyx campanulate, nigrescent, three lines long, with very short, triangular, black-hairy teeth; peduncles very stout, twice longer than the four-inch-long leaves, or subscapiform, and eight inches long in Mrs. Curran's speci-

mens; stipules large, connate below, acuminate and hyaline. In Mr. Parish's specimen the pod is nearly two inches long, linear, contracted at base and sessile, sulcate dorsally, and dorsal septum intruded to the middle of the cell, apex of pod acuminate to an almost thread-like tip which is laterally compressed, pod slightly obcompressed, finely corrugated, coriaceous, rather sparsely villous-woolly when ripe, ventral suture rather prominent; pedicels very short; bracts ovate and rather large. In Mrs. Curran's specimen the pod is completely divided by the intrusion of the dorsal sulcus from the base nearly to the apex, much obcompressed by necessity from the curving of the pod into a circle, ventral suture ridged; perennial and many branched from the base, erect, stem very short.

The above descriptions are drawn from the types. I find that the pods have much shorter pubescence which is more generally appressed; the plants are less branching and peduncles more inclined to be subscapose, and the flowers are more inclined to be racemose; the sulcus is more open and wider; pods narrower than *A. malacus*. Specimens collected by Mr. Brandegee, at Inyo, Cal., April 15, 1892, clearly connect the two. The flowering specimen of the Herb. Cal. Acad. has white or ochroleucous flowers with only a tinge of purple at the tip of the parts; calyx that of *A. Layneæ* and pods of *A. malacus* with the short pubescence on them of *A. Layneæ*; pods not at all obcompressed but decidedly compressed; general habit of *A. Layneæ*. The fruiting specimen on the same sheet has nearly the calyx of *A. malacus* and its branching caulescent habit, but the pods are those of *A. Layneæ*. I also have specimens of *A. malacus* from Western Nevada with pods much like those of *A. Layneæ* but nothing to warrant the reference that Mr. Brandegee's specimens require. I find in Mr. Brandegee's specimens that the keel is as often without a beak as with, and so that character fails.

*Astragalus Gibbsii* Kell. (*A. cyrtoides* Gray.) The type in the Herb. Cal. Acad. has eight to ten pairs of obovate-cuneate leaflets which are so deeply notched as to be obcordate occasionally, at other times they are scarcely notched at all, seven lines or less long, four lines or less wide, shortly petiolulate; petiole less than an inch long; stems and peduncles grooved; corolla

and calyx yellow, the latter with short wool; calyx tube three lines long, two lines wide, teeth a line long and triangular and stout; calyx about as large at base as apex and so short-cylindric; the corolla does not extend more than five lines beyond the calyx teeth; the short very blunt keel whose tip is bent into a semi-circle surpasses the teeth by three lines; the broadly lanceolate wings which are as wide as the keel surpass it by two lines; the broadly ovate banner is sharply arched just beyond the calyx teeth into an erect position and so does not extend as far as the keel; the ovate woolly bracts are hyaline and a line long and equal the stout pedicels; lower part of stem is absent and there is no fruit; stipules triangular, short, green. Collected by G. W. Gibbs on the headwaters of the Carson River, Cal. Read before the Cal. Acad. Nov. 18, 1861. The whole plant has short spreading wool or hairs and is rather canescent; pedicels attached by one corner of the calyx; leaves four inches long; peduncles six inches long, very stout; flowers six to eight, subcapitate.

*Astragalus cyrtoides* Gray, collected by Lemmon in Sierra Valley, Cal., is many stemmed from a woody root, stems often slender, erect and scarcely sulcate, a foot high, flexuous; pubescence even to the calyx the same as in *A. Gibbsii*; leaflets six to eight pairs, from cuneate and almost lobed at apex to oblanceolate and truncate, six lines or less long; petiole seldom over one-half inch long; leaves three inches long; stipules triangular and like those of *A. Gibbsii* but more acute; peduncles four to six inches long, not very stout, grooved; flowers loosely spicate; pedicels two lines long, twice the length of the ovate, hairy bract, not very stout; calyx narrowed, cylindric-campanulate, four lines long, one to two lines wide, scarcely gibbous at base but pedicel bent at point of insertion to a right angle; teeth the same as those of *A. Gibbsii* or narrower; flowers the same but wings surpassing the keel only a little; pod an inch long exclusive of the one-half inch long stipe, acuminate at both ends and sharper at base, three lines wide, one and one-half lines thick, cross-section, shallow-obcordate, short-pubescent with erect hairs, one-celled, neither suture impressed, but pod dorsally sulcate, ventral suture

prominent and sharp edged externally, pod arched into one-third to one-half a circle, erect.

Specimens collected by Mr. Brandegee at Milford, Cal., June 26, 1892, are substantially those of Mr. Lemmon but calyx gibbous, more cylindric; pods less acuminate, and stipe just equaling tip of calyx teeth; pods shorter, slightly arched, both sutures prominent, not at all sulcate or with only a trace of it.

My own specimens gathered at Carson City, Nev., May 23, 1882, are exactly the type of *A. Gibbsii*. Those collected also by me at Empire City, Nev., June 20, 1882, and distributed as No. 3829 have the flowers of *A. Gibbsii* but the calyx a little narrower; pedicels as long or two lines long; leaflets six to ten pairs, like those of Mr. Lemmon's specimens, short-woolly, and whole plant canescent throughout; pods very short-pubescent, not at all sulcate, cross-section about circular, pod an inch long, bent into fully or more than a semi-circle; stipe equaling or twice as long as the calyx; pods oblong-linear, shortly and equally acuminate at each end, stems branched above, a foot high. Other specimens gathered at the same place have pods the same width as the above but only one-half an inch long, very sharply acuminate; stipe shorter than the calyx; pod slightly arched, otherwise as above.

*Astragalus recurvus* Greene. This is *A. obscurus* Watson. I have specimens of *A. obscurus* from Nevada collected by myself with recurved pods, and also specimens from Northern Arizona collected by me near Flagstaff in 1891 with the pods curved fully as much as the type and with crimped edges.

*Astragalus adsurgens* Pall. This species is in great need of a new description for the lobes of the calyx are often as long as the tube, the leaflets vary from linear lanceolate and one and one-half inches long to oblong-elliptical and obtuse or acute. The pods are one-celled, sulcate dorsally from one-fourth to one-third their width and dorsal septum produced as much more into the pod, but never two-celled; the flowers are purple or white. My specimens were named by Gray.

*Astragalus circumdatus* Greene. *Scytocarpus*, and nearest to *A. Chameleuce*, but widely different from it. In uniqueness it ranks

along with *A. pachypus*. Apparently loosely caespitose from a much branched woody base, two to five inches high or more, stems rather slender though not for the size of the plant, nodes one-fourth to one-half inch apart, or even closer; stipules rather large for the plant, scarious, ovate, almost connate, free; stems three to five inches long, ascending or some of them horizontal, almost glabrous; leaves two to three inches long with petiole which is nearly one-half the length; leaflets eight to twelve pairs, one-fourth inch or less apart, truncate or emarginate, oblanceolate to oval, one to four lines long, very decidedly petiolulate, very sparsely pilose, or almost glabrous, the leaves are so small that though the hairs are short they are still long for the size of the leaf; peduncles slender, shorter than the petiole and far overtopped by the uppermost leaves which are not at all reduced but are the largest of all; flowers subcapitate, five to twelve, on slender pedicels which are one to one and one-half lines long and twice the length of the ovate, hyaline, rather pilose bract; flowers horizontal, four lines long, ochroleucous in the dried specimen; calyx tube campanulate, one and one-half lines long, a little longer than the subulate lobes, whitish, rather densely short-hairy and canescent; banner very wide at base and narrower upwards, emarginate, bent at a right angle and erect, a line longer than the keel; keel nearly straight but tip incurved at a right angle and acuminate, the erect part nearly as long as the rest of the blade; wings apparently lanceolate, ascending and little exceeding the bend in the keel; pod apparently horizontal or reflexed, fleshy, coriaceous, one-celled, neither suture impressed but both very thick and prominent and rounded externally, pod minutely and sparsely pubescent when mature, or glabrous, faintly corrugated, abruptly acute with a stout beak and almost acute at the sessile base, six lines long or less, half oval to almost elliptical, ventral suture nearly straight, dorsal arched, apparently a little compressed when young but nearly round thereafter in cross-section, faintly bisulcate on the ventral side but the obcompressed appearance is doubtless due to the pressing, as other pods are as markedly compressed from the same cause. The flowers and pods lie among the leaves but are not concealed by them, usually only two to four pods mature on the

same peduncle and are scattered. The immature pods are quite appressed-hairy. Described from the type in the Herb. Cal. Acad. Collected by Mr. Lemmon at Hanson's Ranch, Lower California, July, 1888.

*ASTRAGALUS ANISUS*, n. sp. This is near the *Mollissimi*. Very low, two or three inches high and very short-stemmed, perennial, silky pubescent, with rather long and loosely appressed hairs which are slender, very echinate, and attached by the middle; stems, stipules, and leaves silvery with long hairs; peduncles less pubescent; calyx nigrescent only, with sparse hairs; pods softly and rather thinly pubescent with short hairs. Leaves two inches long and petiole as long as the rachis, leaflets three to six pairs, obovate to oval, two to three lines long. Peduncles longer than the leaves and with stout fruiting pedicels two lines long. Flowers erect or spreading, six to ten and probably subcapitate; calyx-tube broadly cylindric, four lines long exclusive of the subulate teeth which are less than a line long; corolla not seen; pods almost an exact oval, very obtuse at each end but apiculate at apex and abruptly contracted into a pseudo-stipe which is very short, at base two-celled, six lines long, chartaceous, finely corrugated, sulcate ventrally but not deeply, and slightly sulcate dorsally often. Collected at Pueblo, Colo., by Miss A. P. Lansing, and communicated by Miss Alice Eastwood.

*ASTRAGALUS WETHERILLI*, n. sp. With the habit of *A. triflorus* and nearest to *A. allochrous* in general character except the jointed pedicel. Ascending twelve to eighteen inches high and many stemmed from a rather woody, perennial root, glabrous or very sparsely pubescent on the upper stems and rachis; calyx nigrescent with short hairs; young pods ashy with minute white hairs, mature pods very sparsely and minutely pubescent. Stipules small. Lower leaves small, one to two inches long, with four to five pairs of obovate rounded to retuse leaflets, two to three lines long; uppermost leaves largest, three to four inches long, including the inch-long petiole; leaflets, six to eight pairs, oval to obovate, obtuse, four lines long. Peduncles one to two inches long and capitately six to eight-flowered, rather stout,

with pedicels a line long in flower and two lines long in fruit, twice as long as the ovate bract. Calyx narrowly campanulate two and one-half lines long including the subulate teeth which are a line long; flowers four lines long, white with pink-tipped banner, keel straight to the abruptly incurved (to a right angle) apex, one and one-half lines longer than calyx teeth, wings just surpassing the keel and upwardly curved so as to conceal it, banner two lines longer than keel, broad, rounded, ascending somewhat; pods three-quarters to an inch long, obliquely ovate and shortly acuminate, obtuse at base but contracted, jointed to the line-long stipe at its apex, thin-char-taceous, not pendulous or purple spotted, sulcate ventrally, not at all dorsally, ventral septum also extended a line deep in the centre of the pod but not at all at each end, straight, dorsal septum bent to an arc of an oval, pod inflated and cross-section nearly round.

Collected at Grand Junction, Colo., May, 1892, by Miss Alice Eastwood, and dedicated to Mr. Alfred Wetherill by request.

*ASTRAGALUS CICADÆ*, n. sp. This appears to be near *A. megacarpus*, and has the habit and general appearance of *A. amphioxys*. Perennial, depressed, and almost stemless, three to four inches high. Stipules large for the plant, hairy, acute, and connate below. Petioles, peduncles, and leaves silvery with appressed, very acute, echinate, hairs that are fixed by the middle. Leaves about two inches long, with three to four pairs of broadly to narrowly elliptical leaflets, three to four lines long. Peduncles one and one-half inches, long, decumbent, capitately few-flowered, and with pedicels a line long equaling the ovate, acute, hairy bract. Calyx broadly cylindrical, nigrescent with sparse and very short hairs, four lines long exclusive of the subulate teeth a line long; flowers apparently ochroleucous, exceeding the teeth by four lines, keel nearly straight and but little incurved at the obtuse tip, wings a trifle longer, and nearly equaling the slightly ascending banner; pod obliquely oblong lanceolate, one and one-half inches long, shortly acuminate, somewhat incurved, not stipitate, but a little contracted at base, minutely and rather sparsely pubescent,



purple spotted, young pod pulpy and corrugated, mature pod with membranous outer coat very coarsely reticulated transversely and suggesting the wing of a cicada, inner skin stiffer, both sutures much thickened within and pulpy but not much intruded, pod occasionally slightly sulcate ventrally, very acute.

Grand Junction, Colo., May, 1892. Collected by Miss Alice Eastwood.

The following forms, except the first, would readily pass for new species, but in view of the great variability in the pod of *A. Preussii* it seems better to describe them as varieties until the real limits of that species are known.

*Astragalus Preussii* Gray, Proc. A. A. vi, 222. See also Vol. xiii, 369, and Bot. King's Exp. Rev. *Astragalus*, Watson.

The specimens collected by Miss Eastwood at Moab, Utah, May, 1892, approach the type very closely. Glabrous throughout except calyx speckled and teeth black with flat, short-twisted hairs fixed by the base, plant a foot high; leaflets oval to narrowly elliptical. Peduncles equaling the leaves, stout, five to ten-flowered; flowers spreading and in fruit ascending, purple, three-fourths of an inch long; pedicels a line long and twice shorter than the ovate, hyaline, acuminate bract; calyx five lines long, two lines wide at base, and one and one-half wide at throat, cleft a little deeper on the upper side, teeth subulate, a line long; keel straight, to moderately incurved at blunt apex and scarcely shorter than the wings, banner elongated, purple veined, ascending; pod with evident sutures, abruptly contracted at each end, and with subulate point at apex a line long, this broad based beak is very characteristic, the stipe is about two lines long, and the pod is oblong elliptical. Otherwise agreeing with the type exactly. Collected by Miss Alice Eastwood at Moab, Utah, May, 1892.

*Astragalus Preussii* Gray var. *LATUS*, n. var. Leaves obovate-cuneate to nearly linear; peduncles longer than the leaves; calyx cylindrical; banner shorter and wings longer than in the above; pod nearly round, but ventral suture nearly straight, three-fourths of an inch long, apex subulate three lines long and prow-like, stipe two lines long; pod thick-chartaceous, but not

coriaceous. Plant a foot high, or less, and growing in dense clumps. This is seemingly very distinct, but is connected with the type by forms with ovate pods. In pubescence, pedicels, calyx, and corolla it agrees with the type. Collected by me at Green River, Utah, May 7, 1891, and connecting forms at Cisco at the same date.

*Astragalus Preussii* Gray var. *SULCATUS*, n. var. Densely branched from the base which is almost woody, six inches high. Stipules not large lower ones sheathing, hyaline, very broad and blunt. Leaflets about ten pairs as in the type, but generally narrowly oblanceolate, two to four lines long, rachis two to four inches long, and proper petiole very short. Flowers a line shorter than type on pedicels two lines long, which are twice the length of bract. Calyx three lines long, cleft a little deeper than the type and not contracted at throat, otherwise both calyx and corolla as in the type. Pods horizontal, oblong-oval, abruptly contracted at both ends, apex very acute with a short triangular beak, pod round in cross-section, straight, ventrally sulcate a line deep and suture often extended one-fourth of a line deeper, pod much inflated, chartaceous, three-fourths of an inch long, often reddish, but not spotted. Collected by me in abundant specimens May 6, 1891, at Westwater, Colo., and in fruit only by Miss Alice Eastwood, at Cane Spring, Utah, May, 1892. This is so like the variety *latus*, except in the sulcate pod, that it seems best to put it as a variety of the above.

*Astragalus pictus* Gray var. *ANGUSTUS*, n. var. Like the type but pods eight lines long, two to three lines wide, oblong-oblanceolate very acute at apex and narrowed gradually into the stipe which is as long as the calyx. Collected in Montezuma Cañon, Utah, May, 1892, by Miss Alice Eastwood.

*Astragalus desperatus* Jones. Specimens collected by Miss Eastwood have the over-ripe pods almost chartaceous.

*Astragalus Coltoni* Jones has the pod in one specimen broader and less stipitate, and in another specimen has the leaves much broader, otherwise as in the type.

**ASTRAGALUS PALANS.** Stems long and flexuous ascending or erect from a perennial root, nodes distant, glabrous throughout

except the sparsely nigrescent calyx. Leaves three to four inches long and with a very short petiole, central ones the largest, leaflets on the lower leaves three lines long and obovate and rounded, eight to ten pairs, central leaves with leaflets one-half inch long, obovate to elliptical and retuse. Peduncles very stout, sulcate and longer than the leaves, six inches long and widely spreading, racemosely six to ten flowered near the apex, pedicels a line long and equaling the bract, stout; calyx tube campanulate cylindrical, two lines long, hyaline, somewhat reflexed, teeth one and one-half lines long and filiform from a broad base, keel moderately arched, surpassing calyx teeth by three lines; faintly pink tipped, narrowed at obtuse apex, wings about equaling the keel and the banner is a line longer and pink. Pods about linear, very acutely beaked, sessile, base pendent and apex erect, the pod being bent nearer the base than apex into a sharp curve so that in some cases the apex touches or surpasses the base, very slightly obcompressed, very slightly sulcate dorsally and occasionally so ventrally, dorsal septum produced so as to make the pod almost two-celled, but not quite. This plant seems to be nearest *A. distortus*, but is quite peculiar. Montezuma Cañon, Utah, June 1, 1892, Coll. by Miss Alice Eastwood.

## NEILLIA.

It was my intention to take up this genus later, but in going over my herbarium to fill out some exchanges it has come in my way to study the whole genus.

The recent revision by E. L. Greene has changed the nomenclature considerably.

My method of field study for the last fifteen years has been to collect a large amount of typical material for my sets and exchanges, and to collect for myself from one to five or more specimens of flower and fruit of every deviating form, and to accompany them with such notes as the specimens would not show. I have in this time gathered from a wide field, from Iowa to California, a large amount of material on this and other genera. It early became evident that the characters of Watson's *Neillia Torreyi* as given by himself were valueless, and I sent him a full suite of material showing it, but with his usual persistence he

would not yield. I then decided to take up the genus myself, but lack of time has prevented till now.

I find that the lobation and dentation of the leaves are of little value, also the inflated calyx with connivent lobes, and the shape of the seeds, as well as the pubescence of the pods. The number of seeds in the carpels is very treacherous. The stamens are almost always twenty, in *N. opulifolia* in two ranks and about forty, and the anthers broadly or narrowly oval, the filaments are usually slightly wider at base only and about a line long. The pubescence is always stellate or at least branched in that fashion, but is very variable, and of almost no value. The seeds are always oblique. All the leaves of the genus are three-nerved, five-nerved only by accident.

Taking the order as given by Mr. Greene *N. opulifolia* (L.) Watson, comes first under the heading of "carpels inflated, exerted from the calyx, divergent at apex, bivalvate-dehiscent." The pods are divergent of necessity and are bivalvate-dehiscent a little below the middle to the apex only and not throughout. The range is given as from Canada and Florida to Kansas, while the plant is rather common in Colorado, at least at the base of the mountains on their eastern side at the junction with the Plains. Mr. Greene gives the chief characters as "leaves round-ovate, three-lobed, doubly crenate-serrate, carpels three, four, or five, connate below, one-third inch long, much inflated, usually two-seeded; seeds broadly obovoid."

In my specimens from South Boulder, Colo., collected August 15, 1878, at an elevation of 6000 feet above the sea, and distributed as No. 914, I have one branch with the following leaves on it, one leaf orbicular, not lobed, doubly crenate-serrate; two leaves rhomboidal, lobeless, and doubly serrate as above, base truncate; two leaves rhomboid-ovate, with a very broadly cuneate base, barely three to five-lobed; all the above leaves are rounded and very obtuse at apex; several leaves broadly ovate and barely acute and distinctly lobed above and in other cases below the middle; several others are ovate-lanceolate and very acute and lobed as above. The leaves are from one-half to two and one-half inches long. The pedicels are about an inch long, densely stellate pubescent, the stalk of the stellate hair

very short and the branches very long; calyx densely short-woolly within and without, lobes triangular-ovate and obtuse, a line long, equaling the tube; carpels two or rarely three, flattened, not greatly inflated, very acute, one-third inch long, tips widely divergent, dehiscent a little below the middle, appearing to be glutinous hairy but under the lens vitreous shining and very sparsely hairy with long hairs that are more or less stellate; seeds usually one in each carpel, from ovate to oblong-lanceolate, scarcely a line long and with or without a sharp inner edge, nearly acute, smooth, shining and yellow. Other specimens from the same locality have various intermediate leaves as to serration, lobation, and shape, all showing how futile is the attempt to make a character on the leaves. The venation of all the *Neillia* is really racemose in threes, and not digitate except by accident. On examining a large number of leaves we find that usually the three primary veins come out at the base of the leaf within one-quarter to two lines of each other racemosely, and only rarely exactly opposite, except in *N. monogyna* where it is more common, but this remark as to the racemoseness applies with equal force when there are five apparently digitate veins from the base; in this case the two lateral main veins are branched at base or within a line or two of it. Above the base of the leaf, about four lines, the central vein sends off a pair of secondary veins that are about one-fourth a line to a line apart, and so on. The two lateral main veins branch on the lower side into one or usually two secondary ones, the first near the base, and after that they branch like the main central vein above. The large lateral veinlet is often so near the base of the leaf as to be as near it as the point of separation of the main ones and then is called the fifth vein, but though this can be found in single or a few leaves of a plant it is always less common than the regular form. I have found it on every recognized species of *Neillia*.

In my specimens from Bear Creek Cañon, near Colorado Springs, the leaves are from rhomboid-ovate to lanceolate, but usually broadly ovate, one inch to three inches long and one-half to two and one-half inches wide; calyx always short-woolly on both sides, cleft two-thirds the way to the base, two and one-half lines long; pedicels glabrous or stellate-woolly;

carpels three to five, barely surpassing the calyx or even five lines long, much inflated and almost cartilaginous when short, shining and very sparsely hairy, or in the larger ones membranous, flattened, inflated much or little, abruptly acute, not greatly divergent, seeds one or more, broadly obovate, one-half a line long, ovary always densely white-hairy. From the above it will appear that the leaf character, length of carpels and shape of seeds are very variable in the oldest species.

*Neillia opulifolia* (L.) Brewer & Watson, var. *mollis*, Brewer & Watson; *N. capitata* (Pursh), Greene, Pittonia ii, 29.

My material comes from Oakland and from Duncan's Mills, Cal., and was collected by myself. So far as my specimens go the following is true: Leaves broader than in the type, two to two and one-half inches long, and fully as wide or wider, lateral lobes a little larger than in the type, and very rarely is there any evidence of secondary lobes, as is almost always to be found in the other species of *Neillia*; leaves more pubescent, and more or less cordate at base; carpels vitreous shining, inflated, very sparsely pubescent, shortly acute; seeds lanceolate obovate, incurved or straight; branches not very long nor climbing among the bushes. The corymbs are occasionally proliferous. The only character relied on by Mr. Greene, that of the seeds, proves in my specimens to be valueless, and I cannot see any other good character on which to keep up the species. In some of my specimens at least the seeds are a little narrowed at the apex, but this doubtless is not constant.

*Neillia monogyna* (Torrey) Greene, Pittonia ii, 30. This is the *N. Torreyi* of Watson, etc., in part. It may be advisable for the present to keep up this species, but there is no necessity for concealing the probable fact that it is only the most reduced form of *N. opulifolia*. No character that has ever been given it holds except the less inflated pod. Mr. Greene puts this under the head of "carpels indehiscent," but they are dehiscent doubtless when fully developed as that is the case with the variety *malvacea* (*N. malvacea* Greene). The form which grows on rocks in Colorado is alone sufficiently distinct, but unfortunately the forms growing on better soil and so better nourished differ. The

starved form I have seen hanging from the cliffs, branching widely and very pretty, and generally growing on rocks and occasionally along with *Jamesia Americana*, a foot or two high. This form is best represented by my specimens from Cheyenne Cañon, near Colorado Springs. The leaves are round and deeply cordate to broadly ovate, always three-lobed above or below the middle, lobes deep in some cases and scarcely recognizable in others, occasionally five to seven-lobed but less distinctly so, three-nerved or five-nerved on the same plant as it happens, digitately (as described in the beginning of this article), half an inch or less long, rather thin and almost glabrous; corymbs in my specimens never proliferous, glabrous or stellate-pubescent, ten to twenty flowered, petals one and one-half lines long and scarcely exceeding the sepals or lobes of calyx, flowers small. Another specimen from the same locality has leaves twice as large as well as flowers, and corymbs compound at base. This differs from *N. opulifolia* only in the monogynous ovary and slightly inflated pod, more incised and less pubescent leaves, and smaller size. Other specimens from the foothills are more robust and the most vigorous leaves are often quite acute and long-ovate. Utah forms seem to be rare. I have never found it in Utah, though I collected a peculiar form in the Schell Creek Mountains, Nevada near the western edge of Utah. This is a low, densely branched shrub with leaves one-fourth to one-half an inch long nearly round and usually cordate at base, always very obtuse, seldom more than three-lobed, but doubly crenate with the incisions very irregular, densely and often ferruginously pubescent on the nerves below and softly so all over, but upper surface less so; flowers very small, three to ten and about umbellate; petals not longer than lobes of calyx which are obscurely lacerate and hyaline on the margins, more so than in the smallest form of the type; stamens about twenty and the alternate ones one-half shorter, the larger ones with much dilated base; anthers oval and as in the type attached by the middle and apparently without a bloom while the type has a decided bloom and is oblong oval; style simply two-lobed at apex. Such marked characters would ordinarily be regarded as specific, but I prefer to call it var. alternans, though should

any of the characters given prove to hold, it may bear the name *Neillia alternans*. I fear however that it will prove to be only another of those multitudinous forms that are liable to fall into *N. monogyna* or *opulifolia*.

*Neillia monogyna* (Torrey) Greene var. *malvacea* (Greene, Pittonia, Vol. ii, p. 31). I have seen the type in the University of California, and recognized it at once as our common Utah form with leaves a little more developed on the sterile shoots, due to the more moist locality in which it was found. This is intermediate between *N. opulifolia* and *N. monogyna*, with the habit of the former as well as the leaves and the pod about intermediate. The calyx is not as large as in one form of *N. opulifolia* from Colorado, the lobes are of the general shape of *N. monogyna* and the calyx of every species and variety is campanulate, the lobes of all the genus would be connivent if the pods did not exceed the calyx, the calyxes of all the genus are tomentose within and without but less so without, the leaves are racemose-digitately (as given above) five-nerved in some of the larger leaves but less so than in the var. *alternans* and but slightly more so than in *N. opulifolia*. The name is not distinctive as the leaves are not so malvaceous as in *N. opulifolia* var. *mollis*. The leaves one-half to two inches long vary from reniform to ovate, lobeless to deeply three-lobed with several secondary lobes, main lobes above or below the middle, teeth minute and very many or large and few; pubescence various and inconstant everywhere except on the calyx; flowers quite large or rather small, with the general appearance of *N. opulifolia* as well as size; carpels generally two, seldom if ever inflated, united to the middle with erect or spreading tips, just equaling the calyx and lobes when well developed, slightly rugulose, shortly but not densely pubescent, and shining beneath the pubescence; seeds three, one generally larger than the others, obliquely obovate or narrower and usually somewhat flattened, as is the case with the genus, outline from the back often broadly lanceolate, smooth and shining, yellow, not larger than in *N. opulifolia* and usually shorter and broader than the var. *mollis*. The pod is dehiscent on one or both sides nearly to the middle at least in many cases though tardily; when not fully mature the pod is indehiscent



and as it is often the case that the full development is arrested by the dry weather, doubtless the majority of the carpels are by necessity indehiscent. The fruit is broadly ovate to rhombic and when the seeds occur above the middle of each carpel then it is oval, but never "orbicular" in any specimen from the Great Basin that I ever saw. The peduncles are always short and like the type. The plant is three to six feet high, grows among other brush, is widely branched and closely resembles *N. opulifolia* in general appearance, but is a little stiffer. It ranges from 7000 to 9000 feet altitude, and prefers the north side of steep mountain sides as there only can it get enough moisture. It is common in the mountains, and I have it from many localities in all stages of development.

Comparing my notes with those of Mr. Greene I find no character left to separate it from *N. monogyna* and only the flattened pod to separate it from *N. opulifolia*, while he gives *N. monogyna* as having a somewhat inflated pod which destroys the last valid distinction.

Watson reports the type *monogyna* as from the East Humboldt Mountains, Nevada, and from Stansbury Island, in Great Salt Lake. I have not seen his specimens, but presume they are the var. *alternans*.

Since writing the above I have found a fine fruiting specimen in my collection from Albuquerque, New Mexico, which belongs to the type of *N. monogyna*. The calyx is much inflated or little so, lobes often emarginate; carpels two or three in each calyx, tips needle-like and widely divergent, carpels separate to below the middle, fully as inflated for their size as the less inflated form of *N. opulifolia* from Colorado described above, or perfectly flat and silique-like, scarcely over half the length of the calyx or one-fourth longer, one to three-seeded, seeds very broadly obovate, scarcely yellow, and angular by being crowded in the carpel, carpels dehiscent and bivalvularly so to the middle. These variances all occur on the one specimen. The only way to uphold *N. monogyna* seems to be that adopted by Gray to keep up Aster, namely by an aggregation of characters no one of which is permanent, but some of which are always present when the others fail.

*Prunus demissa* Walpers. An examination of all my material shows that the leaves are never less than subcoriaceous and often coriaceous. The flowers are one and one-half to two times larger than those of *P. Virginiana*. The pedicels and peduncles are stouter, but longer. The shape of the leaves varies, but, on the whole, they are narrower, the bloom on the under side of the leaves varies from about the same as that of *P. Virginiana* to almost white in a specimen gathered at Albuquerque, New Mexico. The bark is duller, but otherwise I see little difference. The fruit of both is very astringent. *P. demissa* is a little stiffer than *P. Virginiana* in habit. I am very familiar with *P. Virginiana* as it exists in Iowa, and have abundance of material from there. I am very familiar with *P. demissa* as it exists in Utah, Nevada, Colorado, and New Mexico. All of my specimens from Colorado are *P. demissa*. I distributed them in 1878 as *P. Virginiana*, as at that time all those forms were supposed to be *P. Virginiana*. I doubt that *P. Virginiana* exists in Colorado. My studies confirm those of Mr. Greene, except in a few unimportant particulars, as given in Pittonia under the head of *Cerasus*.

CYMOPTERUS, SECTION COLOPTERA (C. & R.)

A recent examination of all my material makes it clear that this genus of C. & R. is not well founded. The character given by them in their Revision of the Umbelliferae, p. 49, is substantially as follows. I omit such characters as are not supposed to be peculiar to the genus.

*Coloptera*. Involucre none; lateral wings of fruit corky thickened, dorsal filiform. All other characters given belong equally to Cymopterus. The whole genus is really founded on the corky-thickened lateral wings, a character that is also found in other species of Cymopterus in varying degree, but is concealed by the prolongation of the wings beyond the thickened part. This is seen in *C. montanus*, and were it not for the greatly produced edge of the wing it might be taken for a Coloptera, though there is no thin space between the base of the wing and the seed, as is the case in true Coloptera. In *Cymopterus Jonesii* the thickening of the wing is carried to the utmost limit at the base, and is also contracted a little there at the junction with the seed. In *Cymop-*

*terus glomeratus* the transition is complete. I have specimens collected at Colorado Springs, Colo., whose seeds if taken from the plants would be referred to *Coloptera Jonesii* by the appearance of the wings. This is No. 16 of my Colorado collection of 1878, now distributed widely. In *Coloptera Jonesii* the thickened part of the wing is rather firm ("corky") and varies greatly in thickness, and usually has a thin edge beyond the corky part. In what must pass for *Coloptera Parryi*, from fifty miles south of Lee's Ferry, Ariz., I find the wings much thinner than in *Cymopterus glomeratus*, and most of them with scarcely a trace of thickening, and in none of them would it be noticed by a casual look, but the plant is no doubt a true *Coloptera* otherwise, the more numerous oil tubes, the minute involucre, and the yellow flowers being the only distinguishing characters. In *Cymopterus globosus* the wings are thickened at the apex as much as in any *Coloptera*, but they are very spongy and soft. In *Cymopterus megacephalus* the wings at the apex closely resemble *Coloptera Parryi* in the variable thickening. The inconstant thickening of the wings is well shown in *Coloptera Jonesii*, where the dorsal ones are as thin as paper throughout, or nearly as thick as the lateral ones. At other times the dorsal wings are absent altogether, or only a filiform ridge; the shape of the seed is various; often it is very deeply concave, at other times it is scarcely concave; the lateral wings vary much; at times they are contracted around the deeply concave seed so as to form a cup like the variety *cupulatum* of *Echinosperrum Redowskii*; at other times they are wide and flat.

Another character relied upon by Coulter and Rose for *Coloptera* is the absence of an involucre (which is also true of *Cymopterus glomeratus*). Unfortunately they overlooked this involucre in every case except *C. Parryi*, and I doubt not that it is found in that species also if plants fitting their description in every other respect are rightly referred there. In *C. Newberryi* and *C. Jonesii* I have seldom found it absent, but when it is reduced to a vestige as is often the case it would readily pass for a fold in the top of the peduncle and would lead one to think that the top of the peduncle was fleshy in the green plant, but that is never the case. Under the microscope this is at once

recognized as a hyaline border or involucre. In both of the above species this involucre is one-quarter to two lines wide and often quite evident as much so as in *Cymopterus montanus* the more reduced forms. In *Cymopterus decipiens* the involucre is much more evident as a rule, and in some cases it is as long as the pedicels, that is its lobes which are lanceolate and acuminate and green. *Cymopterus decipiens*, Jones is a true *Coloptera*, and I doubt not that it will fall into *Coloptera Parryi* eventually as the thickening of the wings is of so little account, while I think that *Coloptera Parryi* will be found to have an involucre as I have described above.

Since there is no character assigned to *Coloptera* by Coulter and Rose that holds, it must fall into *Cymopterus* where all its affinities are, where it belongs in habit, structure of the seeds, involucre and involucels. The roots also are those of *Cymopterus* being deep seated and tuberous like *C. montanus* and *C. glomeratus*. Fortunately this reference will not increase the species nor require much change in names, and in the end will I think reduce all the described species to one. I have not now enough forms to make me feel sure that *C. Newberryi* and *C. Parryi* pass into each other, as many of my apparently connecting forms are without mature fruit. However, the following disposition of the species will hold as far as it goes.

CYMOPTERUS, § COLOPTERA (C. & R). Flowers yellow, lateral wings of seeds thickened in the middle so as to form a ring, oil tubes numerous, involucre usually minute, hyaline.

*Cymopterus Newberryi* (Watson), *Peucedanum Newberryi* Watson, Am. Nat. vii, 301, *Ferula Newberryi* Watson, Proc. Am. Acad. ix, 145. *Coloptera Newberryi* C. & R. Rev. Umb. 49. Leaves pinnate and pinnæ toothed or lobed, lateral wings only developed. Southern and Southeastern Utah on clayey or sandy plains. Flowers in May and fruits in May and June. Oil tubes 4-8 in the intervals, 8-10 on the commissure. Plate XXV, fig. D.

Var. *alatus*. *Coloptera Jonesii* C. & R., Rev. Umb. 50. Dorsal wings also developed and thin or corky thickened. This shades into the type and is little more than a form of the species hardly deserving to rank as a variety. Frisco and Milford, Utah, in

gravel on mesas. Blooms in May and fruits in June. I alter the name because there is another *Cymopterus Jonesii*. Oil tubes similar but 8-12 on the commissure. Plate XXV, figs. B 1, B 2.

*Cymopterus Parryi* (C. & R.) *Coloptera Parryi* C. & R. Rev. Umb. 50. Leaves bipinnate and divisions usually small, involucre absent (?), wings of fruit scarcely corky thickened, and dorsal ones almost equally developed, oil tubes one or two more than in *C. Newberryi*. Northwestern Wyoming, Parry. Plate XXV, figs. A 1, A 2.

To the above is doubtless to be referred *Cymopterus decipiens*, Jones, Zoe ii, 246, but this differs in having a hyaline involucre, though small, corky lateral wings, and well developed dorsal ones. Southeastern Utah, on clayey and sandy plains, growing along with *C. Newberryi*, and seeming to pass into it. It flowers in May and fruits in May and June. Though I first described this as often without an involucre, I find traces of one in every plant in my collection as given above. It would be readily overlooked by almost anyone in most cases.

Since the above was written Miss Eastwood has sent me, from Southeastern Utah, a specimen of undoubted *C. Parryi*, every peduncle of which has an involucre as described above. My surmise was therefore correct, and *C. decipiens* may be suppressed, being a synonym for *C. Parryi*.

In the plate accompanying this article the wings of *C. glomeratus* fig. C, were made too narrow at the apex. Seeds of other species figured are *C. longipes* fig. F, *C. Ibapensis* fig. E, *C. Jonesii* fig. G. The figures are taken from the seeds without soaking them up as that generally swells them out of all proportion and distorts the wings. I have made no effort to show other seed characters beside the wings.

*Cymopterus glaucus*, Watson. I see that Coulter and Rose in their Rev. Umbelliferae, p. 81, say that my No. 1688 is this species, but it is not. It is probably *Cymopterus Ibapensis*, but is only in flower. *C. glaucus* is my No. 1687. My numbers never have been duplicated, so it is not necessary to give either the year or the locality of collection, the number tells it all. It is probable that some one has transposed the labels of the two

species in the collections examined. I have one specimen of *C. glaucus*, Watson with an involucre of five, purple hyaline margined, lanceolate bracts as long as those on the involucels.

## ZAUSCHNERIA.

*Zauschneria Californica* Presl. (*Z. latifolia* Greene, Pittonia i, 26.) I am not in a position to discuss the western forms of this species or the species of *Zauschneria* in general if there be more than one species, but I can throw some light on the eastern forms as I know them well. The form which Mr. Greene calls *Z. latifolia* as described by him does not exist in this region so far as I have even seen, though he gives it a wide range from California to Wyoming and south to Mexico.

The common form in this region has the characters of two or three of his species, *Z. latifolia*, *villosa*, and *tomentosa*, in varying degree. A form gathered at Bingham, Utah, July 20, 1880, and distributed somewhat, but not in my sets, has the petals a line longer than the calyx lobes; stamens exerted two lines longer than petals, and style four lines longer; calyx gradually enlarging from a point about two lines above the base; the base of the calyx is bulbose-enlarged; calyx one and one-fourth inches long; capsule tomentose, stipitate; plant two feet high, erect or bent at base; leaves sparingly villous and with the usual woolly pubescence reduced to a minimum, either of very short, flattened, and burnt hairs or only a papilla where the hair ought to be, but some of the leaves always minutely woolly. It is evident that the woolliness will vary with the climatic conditions under which the plant grows, and is of no specific value. This grows among the cliffs in rocks having a shallow soil, or in crevices.

Another form collected by me at Atlat, Utah, in 1879, and distributed by me as No. 1141, grew at an elevation of 8500 feet above the sea on the south slope of the cañon on an almost bare ledge, and, often found by me since in similar situations in the same cañon; is six inches high from spreading decumbent woody stems; leaves short-tomentose and long-villous, lanceolate to ovate, pinnate veined, sparsely and shortly toothed; calyx enlarging from very near the base or from a point two lines above it in other

cases; stamens just exsert; capsule clavate, stipitate, sparsely villous and short tomentose; seeds smooth, faveose, obovate-oblong.

Another form collected and distributed by me as No. 4270, collected at Bowie, Ariz., September 18, 1884, has leaves narrowly to broadly lanceolate, apparently glaucous, but really minutely tomentose, pilose on midrib and young shoots; two feet high; flowers twice as broad as usual, an inch long and enlarging at a point two lines above the base; uppermost leaves linear lanceolate, entire and very acute; lower leaves sharply and irregularly serrate; capsules glandular-pubescent, short stalked or nearly sessile; calyx lobes triangular and acute, nearly equaling the petals; stamens long or shortly exsert, unequal.

I see nothing in the venation of the leaves that is of specific value in any forms of *Zauschneria* that I know.

#### DODECATHEON.

This genus has received considerable attention from Dr. Gray, E. L. Greene, and Mrs. Brandegee. Dr. Gray thought he had found a new character by which to separate species, and E. L. Greene amplified Dr. Gray's species considerably. I am not in a position to throw much light on the Pacific Coast species, and I leave them to others, but I am very familiar with most of the forms of the Great Basin and of Colorado. Mr. Greene, in *Pittonia* ii, 72, says, under the head of *D. pauciflorum*, "The fruit of this common Rocky Mountain Dodecatheon was not known until I obtained it last year (1889)." This is not correct, as I collected and distributed the flowers and fruit of the Colorado forms in 1878 under my No. 131 in twenty different sets. I again sent them out in 1879 from Colorado. The Utah forms I distributed also in 1880 under my No. 2015. I now have both the flower and fruit of some of my original specimens.

So far as the plants east of the Sierras are concerned I doubt if any of them deserve varietal rank, unless it be one Utah form. Dr. Gray seems to have given the plants of Colorado no attention unless he considers them all to belong to the type of *D. Meadia* L.

*Dodecatheon Meadia* L. In the fruit retained by me in my No. 131 from Colorado the capsule is broadly elliptical ovate, and a

little surpassing the subulate calyx lobes, hardly acute; flowers many; bracts ovate and acuminate to linear and acute; corolla lobes five, about an inch long, purple; stamen tube a line long or none, yellow as in almost all other forms of the genus, purple ring present or absent; leaves oblanceolate six inches long, short or rather long petioled, entire; scapes twelve to eighteen inches high; whole plant glabrous and glandless, and the leaves not apiculate. Colorado Springs, May 30, 1878.

All the Colorado specimens in my herbarium have acute anthers, and all my Colorado and Utah specimens have the capsule splitting into five valves through the base of the style. There is no trace of an operculum large or minute falling off like a lid, as is the case in my California plants. Nearly all my Utah plants have obtuse anthers that are linear or larger at apex than below, while the opposite is the case with my Colorado specimens.

My other Colorado specimens were collected in Engelman Cañon, June 14, 1879. They are like the above in the many flowers, bracts, corolla, and calyx, and glabrous throughout, but the stems are two feet high, leaves a foot long, linear oblanceolate, or a little broader, almost acute, petiole very short, calyx oblong ovate, and just exceeding the calyx lobes, or on other stems from the same root the capsule is nearly cylindric, being a little broader at the base and one-half an inch long; in other plants from the same place the calyx is cylindric and narrow, one-half an inch long. I have a few specimens from the same locality that have broadly oblanceolate, short leaves with almost no petiole, and repand toothed, few flowers, otherwise as above, but fruit not seen.

My Utah plants No. 2015 have linear-oblanceolate leaves, with petiole half the length of leaves, and broadly or scarcely margined, whole leaf two to four inches long; scapes six to twelve inches long; flowers four-merous, purple or light-colored; stamen tube none; calyx lobes subulate; bracts lanceolate to linear and very acute; capsule ovate or urceolate, not quite equaling the calyx lobes, the five valves also notched. The whole plant is perfectly glabrous. Collected at Silver Lake, 9000 feet altitude, July 30, 1880, in American Fork Cañon, Utah. Another plant



collected in City Creek Cañon, near Salt Lake City, at about 7000 feet altitude, on July 13, 1880, has broader leaves, on very long petioles, and the fruit on the same stem varies from ovate to lanceolate, equaling the calyx or surpassing it by two lines. In one pod the valves are ten and in the others five or more. This is in fruit only. In other specimens collected at Lake Shore, on the margin of Great Salt Lake, at about 4200 feet altitude, the leaves are small, two to four inches long, oblanceolate and apiculate, or rarely oval, and in that case long petioled; scapes eighteen inches long, few to several flowered; flowers five-merous, purple, small; anthers only a line to a line and a half long, and broader at the very base, tube half as long; immature fruit inclined to be cylindric.

Specimens from Sprucemont, Nevada, gathered by me on July 11, 1891, have scapes one and one-half feet high; leaves oblanceolate, barely acute, three inches long with petiole equaling blade; capsule ovate-oblong, five-valved, twice as long as the subulate-triangular calyx lobes.

Ample material from Deep Creek, Western Utah, collected June 2, 1891, has scapes one and one-half feet high, stout or slender; umbel twenty-five to fifty-flowered; pedicels one to two inches long in fruit; flowers five-merous, purple, small; stamen tube very short or as long as the anthers; anthers two lines long, with a subulate, purple beginning at base and extending above the middle, tips white as well as the margins, no purple ring; leaves four inches long or less, obovate to oblanceolate, entire, tapering into a petiole which equals the blade or is very short; capsule twice to four times as long as the subulate calyx lobes, nearly cylindric, and as in nearly all other Utah plants shortly acute, five-valved, or in many cases ten-valved.

A fruiting specimen gathered by me at Emigrant Gap, Cal., in the Sierras, July 1, 1882, has the capsule and leaves of var. *ellipticum* K. Brandegee and the anthers and stamen tube of var. *Jeffreyi* K. Brandegee. The bracts are lanceolate acuminate with filiform tips. The capsule is urceolate and a line longer than the calyx lobes.

My specimens gathered at Fall Brook, Cal., March 23, 1882, and distributed in my sets as No. 3398, have a slender scape

twelve to eighteen inches high; leaves one to two inches long, oblanceolate to obovate, quickly contracted into a short-margined petiole, finely and closely laciniate-dentate, thick; bracts and adjoining pedicels glandular pubescent; flowers five-merous, large or very large; anthers small one and one-half lines long and blunt, purple-margined and white in the centre; stamen tube about a line long, and deep purple; bracts hyaline, six lines long and lanceolate acuminate, or oblanceolate, petiolate, and green and leaf-like.

Another form collected by me at Soda Springs, Sierra County, Cal., July 27, 1881, answers to var. *Jeffreyi*, K. Brandegee.

If I were disposed I could certainly make at least three new species out of my material fully as good as any that Dr. Gray has described, but I cannot resist the conviction that there is but one polymorphous species whose separation even into varieties is warranted only by the desire to arrange the forms in some kind of succession.

EREMOCRINUM, nov. gen.

This genus belongs to the Liliaceæ, subtribe Anthericeæ, and appears to be nearest to *Anthericum*, though it has some characters in common with *Leucocrinum* and *Glyphosperma* Watson. Perianth rotate, segments three-nerved, white and thin, nerves green; anthers linear, blunt, lobed at base, erect, basifixed and edge to ovary, smooth; filaments linear, broader at base, straight, smooth; slender style elongated, enlarged and capitate at apex; capsule oblong and bluntly lobed, cells apparently two-seeded; pedicels rather stout and jointed near the base; flowers racemose spicate; roots many, long and slender, fleshy, some horizontal; rootstock very short and erect.

EREMOCRINUM ALBOMARGINATUM. This is *Hesperanthes albomarginata* Jones, Zoe, ii, 251. The only change I would make is in the anthers and filaments which I find are not pubescent. I have not yet the mature fruit of this plant. From the first I felt sure that it was a new genus and I withheld it from publication for about a year hoping to be able to decide the matter, but being unable to satisfy myself I finally published it as *Hesperanthes*, though I knew it did not agree with that genus

nor any other that I knew. The name of Desert Lily will fit this plant perfectly, and this is the meaning of the generic name. The leaves are flat and narrow and not terete as would be inferred from my original description. The pollen grains are large, acute at each end and elliptical. The tip of the anthers just equals the style in flower. Capsule ovate to oval, scarcely crested.

#### EXPLANATION OF PLATE XXV.

EREMOCRINUM: "A" plant natural size, "B" flower and pedicel enlarged three diameters, "C" pod enlarged four diameters, "D" stamen enlarged six diameters, showing the auricled base of anther, "E" segment of perianth showing nerves, enlarged three diameters, "F 1" cross-section of upper part of leaf, "F 2" cross-section of lower part of leaf.

CYMOPTERUS: "A 1" seed of *C. Parryi* showing wings, "A 2" same with wider wings, "B 1" seed of *C. Newberryi* var. *alatus* without wings on back, "B 2" same with wings developed, one of them corky thickened, "C" *C. glomeratus* with wings thickened as much as in *C. Parryi* one form, "D" *C. Newberryi* with one rib thickened nearly as much as the lateral ones, a common occurrence; "E" *Cymopterus lbapensis* Jones; "F" *C. longipes* with some of the wings enlarged in the middle after the fashion of the above; "G" *C. Jonesii*. The enlargement of each is shown by the fraction underneath.

#### NOTES ON THE FOOD OF BIRDS. I.

BY WALTER E. BRYANT.

WESTERN GREBE. *Aechmophorus occidentalis*. The stomach of a young one collected on Merced Lake, San Francisco, was distended with feathers, some of them more than 100 mm. in length. The presence of feathers in the stomachs of Podicipidæ has been observed before and attributed to the individual swallowing them while preening its plumage, but in this instance the bird was in downy plumage, and I may add that feathers alone comprised the contents of the stomach. I have also found a few feathers in the stomach of an adult, which was in poor condition, evidently having been suffering for some time from a gun-shot wound, as algæ were growing to the satiny-white breast as they do to the bottoms of boats. In more than a score of individuals of this species which I have dissected there were found small fishes or nothing.

MALLARD. *Anas boschas*. Four specimens examined from Suisun marshes. *a.* Small univalve shells in gullet. *b.* Bearded barley and barley heads. *c.* Small, sprouted seeds. *d.* Half a teacupful of barnacles in the gullet.

GADWALL. *Anas strepera*. Small seeds and sand in the gizzard.

SURF SCOTER. *Oidemia perspicillata*. The gullet of one shot in the water near the edge of a marsh was so full of small crabs that they fell from the mouth when the bird was picked up. Small crabs and mussels form a considerable portion of the food of this species. I have eaten these birds, but do not care for them often. It is difficult to disguise the peculiarity of flavor.

BLACK BRANT. *Branta nigricans*. All of those which I have examined came from Humboldt Bay, and had been feeding entirely upon "eel grass," or "ribbon grass"—(*Zostera marina*), and were extremely fat.

CALIFORNIA CLAPPER RAIL. *Rallus obsoletus*. In the gullet of a bird shot on a salt marsh, near an artesian well, was a good-sized frog.

NORTHERN PHALAROPE. *Phalaropus lobatus*. A number which were collected from tide pools of a salt marsh had been eating small insects and small worms. Wilson's Phalarope (*P. tricolor*) I have observed catching insects from a muddy surface, actually stalking them in a partially crouching attitude until near enough to dart after them, one at a time.

CALIFORNIA PARTRIDGE. *Callipepla californica*. Two males which I shot one evening, as they were going to roost for the night, after having been feeding on a newly-sown field, contained the following, mainly in the crop: *a.* Two hundred and ten whole grains of barley, six pieces of broken barley, three grains of "cheat," and one of wheat, besides a few barley hulls, some clover leaves and alfilaria. *b.* One hundred and eighty-five whole grains of barley, five broken pieces, four grains of "cheat," and two of wheat; also barley hulls, clover, and alfilaria. The flock numbered nearly or quite twenty birds, and had probal ly

taken away from that field nearly four thousand grains of barley during that one evening's feeding.

In some parts of California there is a strong prejudice against the quail, owing to alleged damage to the grape. The evidence which I have thus far gathered shows that the quail do pick at the bunches of grapes, and not alone those bunches which are near or on the ground, but the damage which they cause seems over-estimated. Too often, mutilated bunches of grapes are supposed to be due to the presence of quail in the vineyard, but there are other birds and mammals, also, which vary their diet with grapes. I have examined a number of quail's crops and gizzards without finding the presence of grapes, although the birds had been shot near and in vineyards.

A quail's crop sent to me from Los Gatos, by Mr. A. H. Hawley, contained twenty-five small grapes; others had a few grapes, seeds, and poison-oak berries.

Three very young birds of this species contained, besides a few minute seeds, eighteen, twenty-one, and twenty-seven ants respectively. Ants evidently form a large part of the food of the chicks of quails.

The food of quail is mainly small seeds, and at times more or less green food is eaten; clover and the leaves of a species of *Baccharis* seem to be preferred.

MOURNING DOVE. *Zenaidura macroura*. Small seeds form the principal food of this species according to the crops examined. From one individual collected in Lassen County, I took two-hundred and sixty-seven small pine seeds.

RED-SHAFTED FLICKER. *Colaptes cafer*. Beside the insectivorous food of Picarian birds, the flickers eat largely of poison-oak berries, and I have also found apple in their stomachs.

CALIFORNIAN WOODPECKER. *Melanerpes formicivorus bairdi*. This species is more given to a varied diet than usual with woodpeckers. Besides the fact, which is well known now, that they do eat acorns, various grains are also eaten, and I have known one of these birds to be killed by poisoned wheat put out for ground squirrels. Green corn in the field is eaten and the dry kernels stored away in crevices of trees, as is their practice with acorns.

Several specimens of this woodpecker have been sent to me in the flesh from Visalia, Cal., by Mrs. W. F. Kelsey, in response to my request, as the birds were said to be very destructive to figs. Upon dissection I found the pulp and seeds of figs and nothing else in the stomach. This interesting local instance of injurious habits does not seem to me sufficient ground to justify the destruction of the birds—outside of that orchard. Protection by the use of the shotgun is pretty certain to be enforced by fruit-growers when the actual damage is so evident. I have had marked success in protecting a cherry-tree from the attacks of linnets by suspending a stuffed hawk with out-spread wings over it, and have seen the same plan prove effectual in protecting a soft-shelled almond tree. A stuffed owl is not as effective, acting rather as a “red rag to the bull.”

CALIFORNIA JAY. *Aphelocoma californica*. Mr. H. R. Taylor has sent me a corn cob which was entirely stripped of the kernels by jays in Santa Cruz County. Some stomachs collected by Mr. Hawley at Los Gatos contained only barley. Grasshoppers and other insects, principally coleoptera, are the chief dependence of jays, although in a number of instances I have known them to eat acorns and poison-oak berries.

CLARKE'S NUTCRACKER. *Picicorvus columbianus*. At Summit Station Mr. Belding shot one of these birds, from the crop of which I took 130 seeds of *Pinus ponderosa Jeffreyi*, and quite a mass of partially digested seeds was found in the stomach. The crop was so distended that it was very noticeable when the bird was flying.

FLYCATCHERS AND BEES. Mr. A. Barnett, of San Diego County, had 300 swarms of bees which attracted the flycatchers to such an extent that he made some investigations to ascertain to what extent they might be damaging to the bee industry.

Over 100 flycatchers were dissected, principally Arkansas Flycatchers and Phœbes (Black, and Say's?). In all of the Arkansas Flycatchers drones were found, but no working bees, although in many cases the birds were gorged. In most of the Phœbes drone bees were found, the only exception was that of a

Phoebe (Say's?) in which a bee's sting was found in the base of the tongue.

The birds were all shot about apiaries and were seen darting upon and catching the bees. The examinations were made with a hand lens. Mr. Barnett regards the occurrence of the sting found in the Phoebe as accidental and concludes that Flycatchers are beneficial in reducing the number of drones.

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Since the foregoing notes were written I have received an excellent and timely work by Dr. A. K. Fisher on The Hawks and Owls of the United States in their Relation to Agriculture, and which in itself is so complete and conclusive that I may withdraw the meagre notes which I have made upon rapacious birds; they only confirm the conclusions of Dr. Fisher that most of the hawks and owls are far more beneficial than injurious to the agricultural interests of the country. The microscopical examinations, so far as I made, of the contents of the stomachs of the small land birds of California, are vastly in favor of the desirability of protecting them all. A few local instances where actual damage has been done, notably in fruit orchards, must not be taken as a criterion of the value of the species throughout the State and throughout the entire year.

## THE HOPKINS SEASIDE LABORATORY.

With Plate xxvi.

BY O. P. JENKINS.

The necessity for seaside laboratories for advancement in biological science has been thoroughly discussed and practically settled.

In Europe the conclusions of this discussion have been more extensively accepted and acted upon than in this country. Within the past twenty years a large number of such stations have been established on the coasts of the various countries of Europe. Of all these the most famous on account of its magnificent equipment both in appliances and in a very complete library, as well as for the grand results which have followed its

establishment, is the Zoological Station at Naples. The success of this great institution is due to the enthusiasm and ability of its founder and director, Dr. Anton Dohrn. This institution has been often described, so that something of its work is very generally known. But it is not well known that in Europe there is a large number of well-equipped and well-supported seaside laboratories. It is from these laboratories that the most important biological work of the present time is issuing.

In our own country the history of the seaside laboratory, while it contains some noteworthy undertakings and bids fair to have a brilliant career, is more briefly told. All naturalists are perfectly familiar with the first notable step in this direction made by Louis Agassiz at Penikese. The natural impetus which came to American biological studies from the inspiration engendered by this movement can never be overestimated. Since the death of Agassiz and the closing the school at Penikese, other very successful laboratories have been maintained on the Atlantic Coast, the results of which have been of great value to biological science. The most important and successful of these thus far have been those of the Marine Biological Laboratory and the Laboratory of the U. S. Fish Commission at Wood's Holl, Mass., and the one maintained by the Johns Hopkins University, which has been moved from point to point. Popular accounts of these have appeared at various times. The Marine Biological Laboratory, under the direction of Dr. Whitman, has been especially successful. It has developed very rapidly into a place where a considerable number of biological investigators with a large number of students assemble every year both for research and elementary study. This station is already regarded justly as a very important one and it contributes largely to the current of biological thought in this country. The commendable ambition of its eminent director, if backed as it should be, and no doubt will be, by proper financial support, will make the station at Wood's Holl even more a center for biological research than it is at present.

With all this activity in biological study pursued by modern methods, there is every reason why the splendid advantages of the Pacific Coast should be made to contribute to the progress of



the work. From the moment that the Leland Stanford Junior University proceeded as far in its organization as to have its first nucleus of a faculty appointed, the biologists of that number began to form plans for the establishing of a marine biological station somewhere on the coast. As soon as time from the work of forming new departments could be secured, Professors Gilbert and Jenkins began a search for the most desirable location for such a station. These examinations were carried on quietly, so that no outside influences might be brought to bear to change the choice of a location; the desire being to select a situation wholly on its merits as a suitable place for such a laboratory.

The points taken into the consideration in this selection were first, the natural advantages, then accessibility; and the facility of getting accommodations at which those engaged in the work could pleasantly and conveniently live.

The present location at Pacific Grove was the result of this selection. When it became public that such an institution was to be located on the coast, expressions indicating the most liberal spirit on the part of towns and citizens were volunteered. This shows that the enterprise has been started in a country where exists an intelligent and liberal people, who will not let it suffer for want of financial support.

The highest hope of those who have undertaken the enterprise was to make a very modest beginning and allow the Laboratory to develop by a process of growth, but with the full faith that the humble beginning would soon lead to a more pretentious development.

As soon as the site was selected, the town of Pacific Grove and the Pacific Improvement Company showed towards the proposed Laboratory a liberality which placed in the hands of the directors sufficient land and a considerable sum of money with which to begin operations. Mr. Timothy Hopkins soon took a great interest in the Laboratory and became its principal benefactor. In recognition of his hearty support and great interest in its establishment, the institution has been christened the Hopkins Seaside Laboratory.

With the financial support thus given it, the directors, last

spring, erected a laboratory consisting of a plain wooden structure of two stories, sixty by twenty-five feet.

It is located on the coast near the railroad station just next to what is known as "The Point," or Point Aulon. On the first floor are two general laboratories for elementary students, a store-room and a library room. On the second floor is a third general laboratory and six private laboratories for investigators. The laboratories, both general and private, are furnished with aquaria, which are supplied with running sea-water. The sea-water is obtained from a source which allows it to be perfectly pure. The water is pumped by a gasoline engine to a tank from which the supply is distributed. The Laboratory is also abundantly furnished with excellent fresh water. The Laboratory possesses a very full supply of glassware and reagents. Whatever is needed in the way of microscopes, microtomes, embedding apparatus, and physiological apparatus is taken from the laboratories of Leland Stanford University for the summer. Of this supply there is a good stock to draw from. The Laboratory also possesses a limited amount of collecting apparatus and two boats.

Monterey Bay being a fishing station of considerable importance renders it possible to make use of many outside advantages for collecting.

The session of last summer was under the direction of Dr. C. H. Gilbert, Professor of Zoology, and Dr. O. P. Jenkins, Professor of Physiology and Histology of Leland Stanford Junior University. They were assisted by Mr. F. M. McFarland, Instructor in Histology, Mr. C. W. Greene, Assistant in Physiology, and Mr. B. M. Davis, Assistant in Botany in the same institution.

Seventeen students were in attendance, representing some half dozen States and several institutions of learning.

The experience of this, the first season, demonstrated clearly enough that the choice of the location is a fortunate one in every way. The forms of plants and animals are wonderfully rich in variety, in the numbers of individuals, in interest, in novelty, and in accessibility. It proves a perfect paradise for the marine biologist. Of course, a single season has only served as a beginning toward opening the gates to the treasures here to be gathered.

The size which some of the forms reach, while of less scientific interest than other of their features, renders them astonishing to those accustomed only to Atlantic forms. A species of Holothurian was brought in three feet in length, jelly fishes two feet in diameter, sea anemones which when open were eighteen inches in diameter, chitons, the giants of their race, twelve inches long, keyhole limpets that would weigh two pounds. Great chains of Salpæ were obtained. The fishes of the bay are of great interest. Among the most common forms are various species of the surf fishes, of great interest from the fact that they bring forth their young alive.

Occasionally the bay is enlivened by the presence of whales, shoals of grampus and dolphins, and seals. But the character of this sketch will not permit an account of the life of the coast at this point, of the interesting land fauna and flora, and the beautiful scenery along the whole coast.

The Hopkins Seaside Laboratory while carried on under the auspices of the University is by no means to be regarded as simply a provision for members of that institution. Its advantages are planned for and freely offered to investigators from whatever source. In this work it is not to be at all looked upon as a rival to any of the well-equipped laboratories already in existence, but rather as a colaborer with them. The field it occupies is both unique and important. It would be a serious neglect of biological opportunities to leave it longer unoccupied. The problems which are now present on this Coast, and those which will open from time to time, will attract investigators from other regions. There is now a home provided for them.

Those of this coast engaged in biological study it is confidently expected will take a lively interest in the work of the Laboratory.

There is no field in science more inviting, nor more promising of large results, than those pertaining to the morphology and physiology of marine forms. The time has certainly arrived when those among us with scientific inclination and ambition can turn their attention with profit to these inviting fields. The work of the Laboratory thus far provides for three classes of people. Naturally students in the biological departments in the

University wish to extend their work in the Seaside Laboratory. They are made welcome. Besides these the Laboratory is open to teachers or those especially interested or prepared to carry on biological study. Especial welcome is given to investigators, those well trained in such work, who have problems relating to morphology or physiology of marine plants and animals which they are capable of working out. Among this class no doubt in time many eminent biologists will take their place. From the association and influence of such a class of men, biological study on the Pacific Coast will receive great gain. The teachers of biological science of the colleges and high schools of the Pacific Slope States should in time find in the Hopkins Seaside Laboratory what those of the Atlantic States find in the Marine Laboratory at Wood's Holl.

It is very obvious that to maintain such a station will require no small sum of money. But such important work and so well begun will not lack support. And most certainly the united moral support of those of the Pacific Coast States who are interested in the advance of science in general, and of biology in particular, may be most confidently counted upon.

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## THE BOTANICAL WRITINGS OF EDWARD L. GREENE.

BY KATHARINE BRANDEGEE.

It has perhaps not escaped the notice of the botanical world that there is a very great difference of opinion in certain points, especially in the number of species belonging to the Californian flora, between Mr. Greene and his pupils on the one hand and nearly all the remaining Western botanists on the other. Some explanation of the causes of this difference may be of interest.

All of Mr. Greene's work tends to the inordinate multiplication of species, and his species are, as a rule, so imperfectly described that no one without a close acquaintance with the flora or access to the types is able to make out his meaning. It seems to suit his convenience, wherever there is the slightest ground for difference, to at once describe a new species as vaguely as

possible, both as to character and station, and leave to others the unhappy task of finding out whether it is admissible or not. It is a well-known fact that genera and species can be launched with great ease, and that the process of disproving them is onerous and thankless, the more so as the distant investigator naturally defers somewhat to the one who is supposed to have intimate knowledge of the living organism, and possibly to find differences which are masked in the dead one.

Mr. Greene has described "as new" about 700 species, and resurrected something like the same number of groundless synonyms, nearly all relating to the Californian flora, and thus adding to our already inflated list at least 1000 names. It is safe to say that not more than one in ten of these species is tenable, and probably one in fifteen or twenty would be nearer the mark.

In his earlier work, when he submitted his proposed species to the judgment of Dr. Gray or Dr. Watson, the proportion was much better, though the lapse of time and increasing knowledge of connecting forms is dealing hardly with many of those, and he has not escaped the suspicion of deliberately selecting the extremes and ignoring the intermediates.

The underlying reasons of Mr. Greene's devotion to "new species" are not far to seek. The most important one is his attitude concerning their origin. He openly contemns, as inconsistent with the Mosaic record, the theory of evolution held in greater or less degree by almost all biologists, and proclaims his belief in the special creation and the fixity of species, taking occasional opportunity\* to sneer at the misguided mortals who differ from him. How this belief affects his botanical teachings is evident at once. Rejecting the clue which would lead him through the tangled labyrinth of overlapping forms which so especially abound in the extreme variation of environment found on the western coast of North America, nothing is consistently left to him but to make a new species of every variation, no matter how trivial. That he has not made five times as many is

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\* "And if so is it another of that class of facts which our friends the evolutionists press into service, as indicating that species, and even genera, are created by soil, climate, or in one oft-repeated word, environment?"

due to his really, in spite of frequent claims to the contrary, slight knowledge of the forms belonging to our flora, especially in view of the following presentment of his idea of the distinctions of species. "I have long been of the opinion that many species exist in nature for which no specific characters can easily, or even by any known criterion, be found at all in the perfectly developed individual plant; in other terms that completely and thoroughly distinct species may, and in some cases do so closely simulate each other that, with ordinarily good specimens before him, the most acute botanist will fail to be able to separate even as varieties." \*

Mr. Greene herein makes it perfectly evident that a species is not with him as with most of us a form of life with characters sufficiently and constantly different from others to admit of a clear description and with a name conveniently expressing relationship, but a distinct entity not necessarily in any close relation to other forms now or previously on the earth and to be hunted to its remotest lair properly labeled and put away on shelf for all time. This kind of botany was taught, probably, in the middle ages to which Mr. Greene properly belongs.

The specific descriptions of Mr. Greene are a disgrace to botany. Even in the few instances where he has named valid species—and in such a multitude it sometimes happens—he uniformly fails to grasp the salient points and mistakes most of the rest. Some of these errors are so gross as to be, for a man holding the position of the author, almost inconceivable, and leave the reader to choose only between deliberate misstatement and an ignorance of methods of scientific study unparalleled in a Professor of botany of a modern university. It is, indeed, to be suspected from his descriptions that, though he can write learnedly of embryological observations made by others, his only method of getting at even the cotyledons of any seed smaller than a bean, is to sprout it. In the very few instances where he has ventured to write about the ovules or embryo, his attempts have been fraught with disaster, as in *Viscainoa*† for instance, where with a seed of considerable size he described the embryo as

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\* Pitt. i, 298.

† Pitt. i, 163, 208.

"very small at the base of a copious hard-cartilaginous or almost corneous albumen; cotyledons rounded somewhat convolutely enfolding the short blunt radicle" the fact being that the cotyledons were as long as the seed, and did not enfold anything. Although he had the courage to found a genus upon this plant, he had no conception of its relationship, and sometime subsequently put this near relation of *Guaiacum* next to *Simmondsia*, in his list of the plants of Cedros Island.

In declaring *Syrmatium*\* Mr. Greene says: "In restoring this long-neglected genus, I am not obliged to rest it upon those characters alone, sufficient although they would seem to be, which were indicated both by Vogel and by Nuttall a half century ago. The indehiscent pods promptly deciduous at maturity are so utterly and widely unlike those of any *Hosackia* that I suppose the character being here pointed out, there will henceforth remain less excuse than formerly for confounding the genera." Subsequently in working over the genus† he found himself able not only to reduce *Syrmatium* to *Hosackia* again, but *Hosackia* itself to *Lotus*, remarking that "since the jointed pedicels and deciduous fruiting calyces of, for example, the *Lagopus* subgenus of *Trifolium* are not to be of generic import, neither may they be so treated in this group of *Lotus* which has been called a genus under the name of *Syrmatium*. The indehiscence of the pods is not at all confined to this group of species. In the very type of the *Hosackias* and in all its near allies the dehiscence is so tardy that they may about as well be described as indehiscent."

In *Pittonia* ii, 292, he devotes some space to the fruit of *Garrya*, which according to his account he has just seen mature for the first time. He is astonished that great botanists like Lindley, Endlicher, and Bentham should have been so greatly mistaken as to consider the fruit a berry "when the first glance at these clusters revealed the fact that the fruit is not baccate, but capsular and the capsule has a circumscissile dehiscence. \* \* \* The circumscission of the capsule is neither very prompt, nor in a geometrically perfect circle, but if tardy and

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\* Bull. Cal. Acad. ii, 145.

† Pitt. ii, 137.

slightly irregular, it is still an unimpeachably circumscissile dehiscence."

The fruit of *Garrya*, "pyxis" Mr. Greene calls it, is what is known to most botanists as an "indehiscent berry." It is in fact about as dehiscent and in just the same manner as a gooseberry. Both of them have their tissues strengthened at base and apex and when subjected to violence burst irregularly along the line of least resistance, but if preserved from violence and decay neither of them would "dehisce" in a thousand years. He discourses learnedly concerning *Cicuta Californica* and its root character\* but some kind friend having pointed out his blunder he is obliged to admit† that he had mistaken *Enanthe Californica* for *Cicuta* and that his remarks do not apply; nevertheless undismayed he proceeds to separate, on root characters alone, three new species from *C. maculata*—he thinks one of them may be *Sium Douglasii*, but not being certain takes his usual and easiest method—makes a new species.

He insists upon dismembering the Compositæ; separating the Cichoriaceæ‡ which he considers more closely allied to the Lobeliaceæ than to their present companions—making the possession of a milky juice of more importance in classification than details of structure. It is a relief to find that he does not drag *Asclepias*, *Papaver*, *Euphorbia*, and the Cow tree into the partnership.

His devotion to archaic botany seems to interfere somewhat with a due regard to contemporary literature, as, for instance, in his lengthy account of *Carpenteria*, § where he made the rest of the world aware that he thought a plant in quite common cultivation was still known only in the type specimen; in his rather frequent homonyms and in such instances as *Eriogynia Hendersoni*|| and *Cnicus heterolepis*,¶ both of which he redescribes, being "unable to find that any description was ever published," though the first appeared in the *Botanical Gazette* for 1891, and the second (under *Cirsium*) in *Planta Hartwegiana*.

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\* Pitt. i, 271.

† Pitt. ii, 6.

‡ Pitt. i, 298. *Erythea*, i, 1.

§ Pitt. ii, 67, 141.

|| Pitt. ii, 219.

¶ Proc. Philad. Acad., 1892, 363.



Mr. Greene's memory is apparently often at fault in such trivial matters as may involve the giving of credit to others, especially to those who have rendered themselves obnoxious by presuming to differ from him. A few instances have already been pointed out.\* Among more recent lapses may be mentioned the rediscovery† of *Sanicula maritima* by Miss E. Cannon. Mr. Greene not long ago gave an account of it and its only known locality, ‡ but in "Flora Franciscana" writes of it as if it were not uncommon, and makes no mention of the recent collector.

That he should remember to quote his neighbor's synonymy and forget his own is perhaps quite natural, but it may have a misleading effect upon the "tyro," whom he so frequently mentions. *Cleome Isomeris* Greene of Pittonia i, 200, does not reappear in "Flora Franciscana," neither do the various species of *Atenia*, of which he is the author, and of *Trifolium triflorum* no trace appears.

The author of a local flora is supposed to have a good acquaintance with the plants of his region, but Mr. Greene's knowledge of "his own western hills" is not by any means exhaustive, judging by the three parts of "Flora Franciscana" now issued. A few examples taken at random from the multitude may suffice. He evidently did not know that *Roubieva multifida* covers large areas in San Francisco, and is widespread about the interior towns; that *Chorizanthe polygonoides* grows at a convenient walk from his door; that *Silene multinervia*, *Calandrinia Breweri*, *Claytonia parvifolia*, *C. diffusa*, and *Astragalus Breweri* abound on Tamalpais; that *Cypselea humifusa* and *Glinus Cambesideus* share the muddy margins of pools with "Biolettia;" that *Crantzia lineata* abounds along the river and slough banks from Antioch to Port Costa; that *Cleome integrifolia* is abundant a few miles below Monterey; that *Abronia villosa* is found in the valley of the San Joaquin at least as far north as Alcalde; that *Lotus stipularis* "seldom seen" is common on ridges of Tamalpais and on Redwood Peak in his immediate neighborhood; and that *Euonymus occidentalis*, "apparently one of the rarest

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\* Proc. Cal. Acad., ser. 2, i, 259. Zoe, ii, 80.

† Zoe, ii, 95.

‡ Pitt., i, 269.

of our shrubs," is found in every deep, shady ravine of Tamalpais. By his two synonyms he has made it sufficiently evident that he never saw the red-berried elder, although it grows in Wildwood Glen at Sausalito, and is quite common all about Marin County. By his own confession he has just seen for the first time ripe fruit of a *Garrya*, although two species fruiting abundantly help to make the thickets covering Tamalpais, and he has written, as of distant plants, pages in his usual didactic style, attempting to convince the world that the black- and the amber-fruited forms of *Ribes aureum* are two distinct species, ignorant of the fact that Dr. Kellogg long ago reported it as growing in "Redwood Cañons, back of Alameda," and that it fruits abundantly in both forms in San Antonio Valley, back of Mt. Hamilton, and with no more reason for division than *Ribes spectabilis*, which fruits with similar diversity at Point Reyes.

His descriptions in "Flora Franciscana" are usually quoted, and the attempts at critical work are of the weakest—as for instance where dealing with species well known to him in the living state, he calmly inserts into his flora *Vicia gigantea* and its strict synonym *Lathyrus cinctus*, and *Lupinus cervinus* with its second name *L. sericatus*.

But it is when Mr. Greene enters the field of bibliography and attempts to fix the dates of genera and species that his work stands forth unrivaled. As long as he confines himself to copying from the pages of Pritzel, Jackson, etc., and from Watson's Index he is tolerably secure, but when grown bolder he cuts himself loose and starts on his wild career alone, then chaos comes again.

Everyone knows that the dates given on the title page of many of the botanical books even as late as forty or fifty years ago are inaccurate. The importance of exactness was yet little felt, and priority was not so much regarded. Between the years 1830 and 1846 three English works of much importance to our flora, were published. These were *Flora Boreali-Americana* in two volumes, Botany Beechey, and Botany of the Sulphur. The first bore on title page the date 1840; the second 1841; and the third 1844. The last concerns us at present but little and may be dismissed with the statement that it was evidently

antedated as it quotes the London Journal of Botany for 1845 and De Candolle's, *Prodromus*, vol. ix, also of 1845.

The two first were apparently printed nearly simultaneously. They alternately quote from each other beginning with the California part of Botany Beechey, and continuing in something near the same order to the end.

Mr. Greene adopts ostensibly the dates given in all the lists, 1833 for the first volume of *Flora Boreali-Americana*; 1840 for the second volume and 1840 for the whole of Botany Beechey.

The internal evidence shows that these two publications were printed in irregular parts or signatures at irregular intervals. *Flora Boreali-Americana*, is quoted in Don's *Dichl. Plants*, commencing near the beginning of vol. i, dated 1831, and as Don's volumes are of 700 or 800 4to pages, which, on account of the precision required, would take a long time to print, the evidence is sufficient to show that the first parts of *Flora Bor.-Am.* must have been printed, and to a certain extent distributed early in 1831. These books all followed the same classification, which interferes considerably with the definiteness of dates. Vol. i of Don quotes to *Violaceæ*; Vol. ii, 1832, quotes as far as its classification goes—page 214 of *Flora Boreali* being about the last.

*Flora Boreali-Americana* commences on page 247 to quote Botany Beechey, page 124.

In the light of these data the following dates affixed to the species by Mr. Greene will show how little he is to be trusted, and what a hopeless muddle he has made of the whole matter. They are copied unless otherwise stated from his *Flora Franciscana*.

<i>Anemone deltoidea</i> ,	Flor. Bor.-Am. i, page	6 (1829).
<i>Pæonia Brownii</i> ,	" " "	27 (1829).
<i>Erysimum capitatum</i> ,	" " "	38 (1829).
<i>Physaria didymocarpa</i> ,	" " "	49 (1829).
<i>Cakile edentula</i> ,	" " "	59 (1830).
<i>Hesperis Menziesii</i> ,	" " "	60 (1830).
<i>Platyspermum scapigerum</i> ,	" " "	68 (1829).
<i>Thysanocarpus curvipes</i> ,	" " "	69 (1829).
<i>Cleome lutea</i> ,	" " "	70 (1830).

<i>Viola sarmentosa</i> ,	Flor. Bor.-Am. i, page	80 (1833).
<i>Psoralea physodes</i> ,	" " "	136 (1830).
<i>Astragalus lentiginosus</i> ,	" " "	151 (1830).
<i>Vicia gigantea</i> ,	" " "	157 (1830).
<i>Cerasus emarginata</i> ,	" " "	169 (1830).
<i>Spiræa Douglasii</i> ,	" " "	172 (1830).
<i>Oenothera Boothii</i> ,	" " "	213 (1833).
<i>Hosackia tomentosa</i> ,	Bot. Beech. "	137 (1836).
<i>Adenostoma fasciculatum</i> ,	" " "	139 (1840).
<i>Oenothera alyssoides</i> ,	" " "	340 (1840).
<i>Godetia lepida</i> ,	" " "	342 (1836).
<i>Gaura decorticans</i> ,	" " "	343 (1840).
<i>Enanthe (Helosc.) Californica</i> ,	" " "	142 (1840).

As if this kind of thing were not ridiculous enough he gives the following:

"*Sanicula arctopoides* H. & A.; Hook. Fl. i, 258 t. 90 (1833); Bot. Beech. 141 and 347 (1840)."

"*Sanicula Menziesii* H. & A.; Hook. Fl. i, 258 t. 90 (1833); Bot. Beech. 141, 347 (1840)."

As both of these species are quoted on page 258 of *Flora Bor.-Am.* from 'Hook. et Arn. in Bot. of Beech. Voy. p. 141' for the first and page 142 for the second species, Mr. Greene deliberately commits himself to the theory that Hooker in *Flora Bor.-Am.*, published in 1833, was able to prophesy on what page of a work published seven years later a given species would appear.

Rees' *Cyclopædia* is in thirty-nine volumes of text with several of plates. Every one of the volumes of text bears on its title-page the date 1819. They follow each other in the order of the alphabet, and are not paged. Mr. Greene appends certain dates to the species quoted. How he arrived at them he can best explain. The following are examples. The words in brackets are by the writer:

*Achlys triphylla* Smith, Rees' Cycl. (1812?) under *Leontice* [vol. xx].

*Phaca densifolia* Smith in Rees' Cycl. (1819) [vol. xxvii].

*Ribes malvaceum* Smith Rees' Cycl. xxx (1815).

*Ribes ferox* Smith Rees' Cycl. xxix (1815).

*Ribes stamineum* Smith Rees' Cycl. (1815). [Smith's paper on *Ribes* is eight pages in length, and entirely in Vol. xxx.]

*Viola adunca* Smith Rees' Cycl. (xxxvii) 1817.

These are but examples of numerous others, a few of which will be noticed in subsequent pages, and yet, Mr. Greene, as is well known, poses as bibliographical purist, and is remarkably fond of pointing out the shortcomings of others in this respect.\*

The genera proposed by Mr. Greene are, with the notable exception of "*Biolettia*," founded on sections of other authors, on aberrant species to which attention had been called by others, or as substitutes for older names which he considers untenable. The changes made by the resurrecting of synonyms and the rejection of homonyms are of much greater extent and made as most of them are without judgment or sufficient research have inflicted an appalling synonymy upon the Flora of California.

The principal generic changes so far made or adopted by Mr. Greene in his *Flora Franciscana* and other papers, are:

*Clematitis* L. instead of *Clematis* L. This is one of the changes in which Mr. Greene follows Otto Kuntze. It is effected by taking as the Linnean date the first edition of the *Systema Naturæ*, two years earlier than the period commonly received. The additional syllable in the name seems the only thing to be gained by this transfer.

*Kumlienia*, Greene founded on *Ranunculus hystriculus*, principally on the utricular akenes, though they are hardly more utricular than in *R. Nuttallii* or even in the common *R. Cymbalaria*.

*Chrysamphora*, Greene for *Darlingtonia* because there is an older *Darlingtonia* in synonymy. As, however, the "once a

\* The latest of these diatribes is to be found in "*Erythea*" for May, 1893, where the author, in the course of "damning with faint praise" Professor McMillan's *Metaspermæ* of the Minnesota Valley, says, "We might have expected much of bibliographical laxity and inaccuracy in any author who could speak of Watson's Index as being a book 'remarkably exact.'"

synonym always a synonym " rule has not been adopted as yet by any considerable number of botanists no one need be in haste to discard the well-known name. It must not be forgotten that many generic names are retained in deference to usage, though hardly considered valid, and that if change is insisted upon some at least are likely to be merged in their nearest neighbors. The differences between *Darlingtonia*, and *Sarracenia* are very slight.

*Alsinella* Dill. is taken up for *Sagina* L. in violation of all botanical rule.

*Tissa* Adans. is adopted instead of *Spergularia*, *Lepigonum* or *Buda*. The best way out of this tangle is, in the writer's opinion, to remand the few valid species to *Spergula* from which some of them can hardly be distinguished.

*Bursa* L. for *Capsella* Moench. If the proposition emanating from a group of German botanists, and adopted by the botanical section of the American Association, meets with general acceptance this change will not be required.

*Heterodraba* Greene is *Draba unilateralis* Jones. It differs in habit, but not in technical character from other *Drabas*. It is a singular botanical judgment which sustains *Heterodraba* and *Tropidocarpum*, while reducing *Stanfordia* to *Caulanthus*.

*Athysanus* Greene was founded on *Thysanocarpus pusillus*. The author seems never to have been able to get at the details of its structure. The depauperate strap-shaped petals, and membranaceous filaments widened toward the base are as in *Draba unilateralis*, but the pod, which in San Francisco specimens is often destitute of hooked hairs, is constantly 1-celled, 4-ovuled and 1-seeded. The *Cruciferae* are badly in need of a general revision. In their present state no botanist adds to his credit by proposing new genera among them.

*Hesperalcea* Greene is one of Dr. Gray's section names raised by Mr. Greene to generic rank. As *Sidalcea* is itself becoming much weakened it would seem hardly necessary to erect one of its species into a separate genus.

*Toxicodendron* L. for *Rhus* L. A *Systema* name.

*Lotus* L. for *Hosackia* Benth. With this we agree.

*Xylothermia* Greene for *Pickeringia* Nutt. On the "once a

synonym always a synonym" plan. The fruit of *Pickeringia* seems to be so far unknown and may alter its place in classification. The pod is from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches, 5-9-ovuled, 2-4-seeded, flattened, constricted between the seeds, but not jointed, dehiscent along the ventral side; seeds with thin foliaceous cotyledons, and rather abundant endosperm.

*Viscainoa* Greene had long been known as *Staphylea*? *geniculata* Kell. Everyone knew that it did not belong to *Staphylea*, but as only old fruiting specimens were known, no one but Mr. Greene ventured to give it a new name. It is one of a series of monotypic or restricted genera all very near *Guaiaecum*.

Mr. Greene divides *Prunus* into *Cerasus*, *Prunus*, and *Amygdalus*; adopts *Sorbus* instead of *Pyrus* and separates *Malus*. All this has been done before and rejected.

The separation of *Spiræa* into a half dozen or more genera will commend itself to such botanists as appreciate very fine distinctions and take pleasure in a complicated synonymy. One of these genera, *Eriogynia*, deserves some notice. Mr. Greene says:

"I had long suspected that Bongard's paper on the vegetation of Sitka, read in the St. Petersburg Academy on the fourth of May, 1831, must have been printed and distributed before 1833; in which case it would antedate much of the first volume of Hooker's *Flora*. Dr. Otto Kuntze's careful and extensive researches into bibliography have brought forth the fact that Bongard's paper was indeed distributed before the end of 1831. It is therefore inevitable that *LUTKEA* must displace *Eriogynia*."\*

Otto Kuntze as his authority for the earlier date of Bongard says that, according to a statement of De Candolle, Bongard's paper had been already noticed by him in 1831.

It has already been shown on a previous page that a large part of the first volume of Hooker's *Flora*, Bor-Am. was quoted by page and plate in volumes issued in 1831 and in 1832.

It is a fact which seems to have escaped the notice of Mr. Greene, that contemporary botanists, even those who would apparently be the first to know, make no such claim; for instance, Walpers *Repertorium* ii, 53, published in 1843, quotes Bongard

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\* Pitt. ii. 219.

*Pyrus diversifolia* as a synonym of Hooker's *P. rivularis*, Flor. Bor-Am. i, 303.

Maximowicz, of St. Petersburg, who might be supposed to know the date of a Russian work, says in Adn. de Spiræaceis: "Names [*Eriogynia* and *Lutkea*] by Hooker and by Bongard published in the same year, the latter perhaps earlier, but Hooker's preferred because the specific name is correctly given."

*Osmaronia* Greene for *Nuttallia* T. & G. "Once a synonym always a synonym." *Nuttallia* is, however, easily reducible to *Prunus*.

*Kunzia*, Spreng for *Purshia* DC. for the same reason.

*Micrampelis* Raf. for *Echinocystis* T. & G. Rafinesque's names should not be received until his diagnoses are republished. Many of his papers are almost inaccessible, and before submitting to the changes involved in the restoration of his names, the botanical world should have the means of judging whether they deserve to be resurrected or not. Mr. Greene is notoriously partisan, and a strong partisan is never a just judge.

*Osmorrhiza* Raf. is reduced to *Myrrhis* Moris. The former is as good a genus as most of those at present accepted in the family. Any reduction in their number is, nevertheless, to be welcomed.

*Lilaopsis* Greene for *Crantzia* Nutt. "Once a synonym," etc.

*Caprifolium* L. for *Lonicera* L. Systema name.

*Obolaria* Sleg. for *Linnæa* Gronov. Before the Linnean date.

*Trichocoronis Wrightii*, Gray, a small Eupatoriaceous plant now becoming naturalized in California having been discovered by one of Mr. Greene's pupils, was described by him as a new genus and species *Biolettia riparia*, Greene, which according to him "has the aspect of a small *Erigeron* but with fruit characters of the *Helenioidæ* \* \* \* suggests at once *Eclipta* and *Spilanthes*." Having had his error corrected by the writer\* he after the lapse of a year attempts to evade the matter in the following way, which at the least can hardly be encouraging to any one wishing to believe the author's blunders to be inadvertent.

"*TRICHOCORONIS* a small group of flaccid riparian herbs, though perhaps best placed here, imitates *Erigeron* of the next

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\* *Zoe* ii, 301.



tribe in general aspect, and lacks even the clavate style-branches of this one, these organs being nearly linear and even somewhat compressed, rather than terete and claviform. Although the type of the genus has pentagonal achenia and a coroniform concreted pappus, a newly discovered Californian ally of it displays exactly quadrangular akenes surmounted by distinct and conspicuous pappus paleæ and equally distinct bristles alternating with them. This I have published as a genus *Biolettia*; and, with authors who, like Bentham and Asa Gray, make much of this kind of character, allowing it to overbalance all considerations of agreement in habit, *Biolettia* will be received in generic rank. But, as the type is a *Trichocoronis* in *facies* I now prefer to treat it as an aberrant member of that genus, and rename it:

TRICHOCORONIS RIPARIA. *Biolettia riparia*, Greene, Pitt. ii 216.\*

Mr. Greene should call this kind of thing Comical Notes instead of "Critical Notes." "*Biolettia*" has been distributed to a considerable extent and any one who has a specimen may see for himself that the style branches are terete and somewhat thickened upward, and that the pappus is exactly what Dr. Gray describes "a minute but evident crown of more or less concreted setuliform squamellæ or some of them aristellate." The akenes are always pentagonal though the faces are unequal. Bentham and Hooker say "In specie altera (*T. Wrightii*) styli rami subteretes et pappus conspicuus, in altera (*T. rivularis*) styli rami supra medium complanati et pappi pili minuti."†

The plant has just the appearance of a small pale *Ageratum* and the attempt to liken it to *Erigeron* is an unworthy evasion of the fact.

It has been compared at Harvard with the type of *T. Wrightii* and found to be exactly the same.

*Coleosanthus* Cass. for *Brickellia* Ell. Although Mr. Greene evidently doubts the sufficiency of the characters separating *Brickellia* from *Kuhnia*, he nevertheless supplements Dr. Kuntze by transferring a few additional species. Baillon reduces *Brickellia*

\* *Erythea* i, 41.

† *Genera Plantarum* i, 241.

to *Eupatorium*. Bentham says "Genus *Kuhnæ* quam maxime affine." Until these questions had been settled we might have been spared the synonymy.

*Blepharipappus* Hook. Fl. Bor-Am. i, 316, for *Layia* Bot. Beech. 148. Mr. Greene gives the synonymy of this genus, according to his idea, on page 245 of the second volume of *Pittonia*. He there entirely overlooks the naming of *Layia* which occurs on page 148 of *Botany Beechey*, giving reference only to the later page where it is found. It is possible that *Blepharipappus* is a trifle earlier than *Layia*, but so far as we now know the fact cannot be established. The volumes were published so nearly at once and quote each from the other in so irregular a manner that the internal evidence leaves the reader in doubt. It is certain that page 142 of *Botany Beechey* was printed before page 255 of *Flor. Bor-Am.*, for the latter, there quotes from the former. On the other hand it is equally apparent that page 295 of *Flor. Bor-Am.* was printed before page 146 of *Bot. Beechey*. On the whole it appears to have been entirely unnecessary for Mr. Greene to transfer the species, even though by so doing his name is made to follow all but one of the new combinations.

*Hazardia* Greene of a single species amplified to three by the author, did not require the generic name.

*Ereminula* Greene is substituted for *Dimeresia* Gray, because of previous names, "*Dimeria*" "*Dimesia*" "*Dimetia*" and "*Dimeresa*." Following such rule, *Crockeria* might be in danger from the earlier "*Krockeria*."

*Agoseris* Raf. for *Troximon* Nutt. The attempt to bring this name into use is an outrage. It occurs on page 58 of *Flora Ludoviciana* in the concluding sentence of Rafinesque's description of the fictitious *Troximon odoratum* Raf. founded on Robin's '*Chicoracée fenouillette*' and is as follows: "This species together with *Tr. virginicum*, *Tr. pallidum* and *Tr. bulbosum* will form the genus *Troximon*, the other species which are acaules and with an emblicated [!] calyx must form a peculiar genus which I shall call *Agoseris*." No type species is indicated and no one can be certain of what plants Rafinesque had in that store-

house of vagaries known as his mind. Mr. Greene, however, transfers all the species, attaching his name to every one.

This certainly is not held by reputable naturalists as valid publication of a genus, and Mr. Greene, by failing to reprint the "generic character," lays himself liable to the suspicion of a deliberate attempt to deceive.

*Nemoseris* Greene for *Rafinesquia* Nuttall, "once a synonym." *Rafinesquia* is not considered a valid genus by either Bentham & Hooker, or by Baillon.

*Ptiloria* Raf. for *Stephanomeria* Nutt. Such weak genera as this will hardly bear the strain of a set of synonyms; it is much too near *Lygodesmia*. Baillon reduces it to *Lactuca*.

*Psilostrophe* DC. for *Riddellia* Nutt. This is an older name, apparently, for the same genus. Dr. Kuntze and Mr. Greene have transferred the species independently, and those who append the names of the authors of combinations may have some trouble with their priorities.

The various genera into which Mr. Greene divides *Microseris*, etc., are not recognized nor are they likely to be.

*Bolelia* Raf. for *Downingia* Torr. will cause very little trouble either way.

*Solanoa* Greene for *Schizonotus* Gray which has already been reduced by different authors to neighboring genera.

*Clevelandia* Greene though very near *Orthocarpus* was considered a valid genus by Dr. Gray.

*Lappula* Moench will probably have to be substituted for *Echinosperrum* Lehm.

*Adenostegia* Benth. is of course the older name for *Cordylanthus*.

*Audibertia* Benth. is reduced to *Salvia* L. with which it is thoroughly confluent; but Mr. Greene, giving an extraordinary description of the corolla of *Audibertia polystachya*, confusing the bud and the flower, makes it the type of a new genus "Ramona."

*Lepargyrea* Raf. for *Shepherdia* Nutt. Mr. Greene will have to make a better showing for this genus than he does\* if he seriously desires the change. He gives sufficient extracts from

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\*Pitt. ii, 121-122.

Rafinesque to convict the latter either of deliberate falsehood or of eccentricity bordering on madness.

*Tumion* Raf. for *Torreya* Arn. In order to make this change Mr. Greene would displace *Synandra* of the Labiates, by an earlier *Torreya* of Rafinesque, and thus render Arnott's *Torreya* unavailable for the Coniferous genus.

*Razoumofskya* Hoff. for *Arceuthobium* Bieb. Let us hope that research may find a less hideous name available for our pine mistletoes.

*Unifolium* for *Smilacina* Desf. In order to have the pleasure of using this name for our very leafy *Smilacinas* we are to reduce them to *Maianthemum* and then take an older name for for that genus. Otto Kuntze would have us adopt Necker's *Tovaria*. There are certain botanical works which though dealing with systematic botany are usually ignored. Necker's "Elementa" might with very good reason be added to the list. He begins by dividing all known plants into fifty-four "Natural Genera" and groups the genera of other botanists under each "Genus" as species. The only indication as to whether his "species" are original or otherwise is given near the end of the third volume by his index of "Species Naturales Botanicis ignotæ, quibus nomina Neckeriana accommodantur," in the 400 or so names of which there may be found plenty of material for unsettling genera.

The new species proposed by Mr. Greene have, in most cases when critically examined, failed to receive the approval of competent botanists, and they appear to suffer in direct proportion to the examiner's familiarity with the Californian Flora.

Dr. Gray died before Mr. Greene was fairly launched in his species-making and before the collecting of variations had made more than a beginning, nevertheless he, in the supplements to his Synoptical Flora, reduced the following species :

<i>Pentachæta aphantochæta</i> .	<i>Lessingia nemaclada</i>
<i>Pentachæta palcacea</i>	<i>Corethrogyne detonsa</i>
<i>Bigelovia rupestris</i>	<i>Erigeron angustatus</i>
<i>Bigelovia tridentata</i>	<i>Helianthella Nevadensis</i>
<i>Lessingia Parryi</i>	<i>Madia Rammii</i>
<i>Lessingia adenophora</i>	<i>Hemizonia Lobbia</i>

<i>Hemizonia hispida</i>	<i>Asclepias pinifolia</i>
<i>Hemizonia spicata</i>	<i>Gilia heterodoxa</i>
<i>Hemizonia oppositifolia</i>	<i>Krynitzkia Cedrosensis</i>
<i>Layia graveolens</i>	<i>Krynitzkia cycloptera</i>
<i>Blepharizonia laxa</i>	<i>Convolvulus fulcratus</i>
<i>Lasthenia Coulteri</i>	<i>Chamæsaracha physaloides</i>
<i>Hymenopappus robustus</i>	<i>Antirrhinum Kelloggii</i>
<i>Senecio Austinæ</i>	<i>Pentstemon Kleei</i>
<i>Senecio ammomphilus</i>	<i>Pentstemon pauciflorus</i>
<i>Senecio Layneæ</i>	<i>Mimulus acutidens</i>
<i>Senecio Howellii</i>	<i>Mimulus barbatus</i>
<i>Hieracium brevipilum</i>	<i>Mimulus Hallii</i>
<i>Nemacladus capillaris</i>	<i>Mimulus inodorus</i>
<i>Nemacladus montanus</i>	<i>Mimulus microphyllus</i>
<i>Nemacladus pinnatifidus</i>	<i>Eunanus Breweri</i>
<i>Nemacladus pubescens</i>	<i>Eunanus Layneæ</i>
<i>Nemacladus tenuissimus</i>	<i>Plantago Californica</i>

Prof. C. S. Sargent in his magnificent "Trees of North America," reduces every one of Mr. Greene's species occurring thus far in the work of which four volumes are now published. They are *Rhamnus insularis*, *Rhamnus rubra*, *Ceanothus arboreus* (retained as a variety), *Cerasus Californica*, *Lyonothamnus asplenifolius*, *Amelanchier glabra*, *Amelanchier pallida*. *Ptelea crenulata* is not even mentioned. Besides these all the species revived from synonymy by Mr. Greene are reduced.

Rev. Thomas Morong revising in Bull. Torr. Club xv. the American Typhaceae reduces the species of Mr. Greene, *Typha bracteata* and *Sparganium Californicum*, belonging to that order.

Prof. William Trelease has also reduced the species of *Rhamnus*, as well as of *Epilobium*.

C. F. Millspaugh in Pitt. ii, 82-90 considers *Euphorbia Neomexicana* and *E. rugulosa* Greene to be merely varieties of *E. serpyllifolia* Pers.

The species of *Astragalus* proposed by Mr. Greene have been recently studied from the types, and the notes upon them appear in pages 22—33 preceding.

The descriptions of the species hereinafter enumerated are in most cases to be found either in the series of papers issued by

Mr. Greene under the name of "Pittonia" or in his "Flora Franciscana." The references of the few exceptions are given. No attempt has been made to verify all of the species. To do so would, in many cases, necessitate the partial revision of large genera and the study of priorities, involving an amount of time not now at the disposal of the writer. For these reasons the two score new species and the various genera "instituted" within the limits of the old genus *Eritrichium* and the numerous species of *Delphinium*, *Trifolium*, *Potentilla*, *Erigeron*, *Cnicus*, *Senecio*, *Microseris*, etc., are here neglected, as well as many of the of the *Cruciferae*. Fortunately for the interests of science the larger number of the types are in the herbarium of the California Academy of Sciences. The later ones are being mounted and rendered accessible in the herbarium of the University of California at Berkeley, and if the notes given under the species seem to bear hardly upon the capacity or the judgment of Professor Greene, the means of proof or disproof are in most cases at hand.

*Thalictrum caesium* Greene is apparently *T. polycarpum* Wats., but that species is so near *T. Fendleri* that it is uncertain to which it had better be referred.

*Thalictrum hesperium* and *C. platycarpum* Greene are forms of *T. Fendleri* Engelm. Mr. Greene keeps the name up, although he says it "seems almost or quite confluent with *T. Fendleri* of the southern Rocky Mountains."\*

✓ *Ranunculus Bolanderi*† Greene is, according to Dr. Gray, typical *R. alismæfolius* Geyer.

✓ *Ranunculus Biolettii* Greene is *R. pusillus* var. *Lindheimeri* Engelm. It has been collected by the writer at Folsom, and about ponds near Olema, where it is common, it is often a foot or more in length.

In *Flora Franciscana* Mr. Greene describes *R. pusillus* Poir, and remarks: "Rare in California, though common in the southern Atlantic States; found in Napa Valley, *Bigelow*, and in Marin Co., *J. P. Moore*. The akenes are either smooth or rough in even the eastern plant, so that the designating of ours

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\* Fl. Fr., 310.

† Bull. Cal. Acad. ii, 58.

as a variety seems unwarranted." This was published in April, and in the following month he described the species, from plants collected near Bigelow's Station, as *Ranunculus Biolettii*. Dr. Gray, in his last revision, calls the plant *R. pusillus* var. *Lindheimeri*. It is *R. trachyspermus* Engelm. var. *Lindheimeri*, but there was an older *R. trachyspermus*. Dr. Gray implies that *R. Bonariensis* Poir and *R. fontanus* Presl. are too nearly related to it, so also is apparently *R. humilis* H. & A.

✓ *Ranunculus Ludovicianus*\* Greene is *R. Californicus*, var. *latilobus* Gray. The type was collected by the writer.

✓ *Ranunculus maximus*† Greene is *R. orthorhynchus* var. *platyphyllus* Gray. It is rather common in Marin County and has been collected by the writer at Ager, near the Klamath River. The extremes of its foliage are much less than are shown between such forms of *R. Californicus* as the prostrate plants with thick, hardly divided leaves, at Point Lobos, and the slender, erect ones with very finely divided foliage, which grow about Castroville.

✓ *Ranunculus alismellus* Greene is *R. alismæfolius* var. *alismellus* Gray.

✓ *Ranunculus rugulosus* Greene is evidently a mere form of *R. Californicus* Benth.

✓ *Ranunculus ellipticus* Greene. In Pitt. ii, 110, this is described as "a widely dispersed and often collected for western species, which has long been wanting specific definition," and shortly after in Flora Franciscana it is reduced to *R. glaberrimus* Gray.

*Ranunculus subsagittatus* Greene was raised in rank from *R. Arizonicus* var. *subsagittatus* Gray, in Pitt. ii, 59, where he remarks that "*R. Arizonicus* looks a good deal more like the ordinary Rocky Mountain *affinis* than does the preceding." On page 110 following he admits having jumbled the species and reduces his *subsagittatus* in consequence.

*Ranunculus Turneri* Greene is apparently *R. lasiococcus* Ledeb.

*Berberis pumila* Greene is *B. repens* Lindl. and the earliest specimen so labeled was from Mt. Hanna in Lake County.

*Vancouveria chrysantha* Greene is *V. hexandra*, M. & R.

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\* Bull. Cal. Acad. ii, 58.

† Bull. Torr. Club, xiv. 118.

*Argemone corymbosa* Greene is *A. platyceras* Link & Otto. It was found about a railway station on the Mojave Desert and has been only once collected.

*Papaver Lemmoni* Greene is *P. Californicum*\* Gray.

Mr. Greene refers *Meconopsis heterophylla* to *Papaver* and copies the incorrect reference of Bot. Calif. to the plate number of Hooker's *Icones*.

*Platystigma (Meconella) denticulatum* Greene is *Platystemon Oreganus* (Nutt.)

*Dendromecon flexile*† Greene is *D. rigidum* var. *Harfordii* (Kell.)

*Platystemon crinitus* Greene is *P. Californicus* Benth.

*Eschscholtzia Austinæ*, *glyptosperma*,† *Mexicana*,§ *peninsularis*,|| *rhombipetala*, *elegans*,¶ *ramosa*,\*\* *Parishii*,†† *maritima*, *modesta*, *tenuisecta*, *leptandra*, *Lemmoni*,‡‡ *ambigua* Greene are unnecessary additions to the synonymy of the genus, all possible species having been already amply provided for in previous synonyms. In *Flora Franciscana*, perhaps having reason to fear that his *E. glauca* was in danger of being mistaken for a half dozen other species, he provides it with a new and striking character—"Species exceedingly well-marked by a certain not well-definable grace of its very beautiful white-glaucous foliage." The phrase is so inimitable that one regrets to disturb it, but judging by the type specimen the "white-glaucous" part is a mistake.

*Nasturtium occidentale* Greene is *N. curvisiliqua* (Hook.). The statement that the pods are "flattened contrary to the partition" is misleading, the partition being nearly as broad as the valves.

*Nasturtium dictyotum* Greene. This exactly matches specimens of *N. sessiliflorum* Nutt. and other specimens current as *N. palustre* DC.

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\* Zoe, ii, 121.

† Bull. Torr. Club, xiii, 216.

‡ Bull. Cal. Acad. i, 70.

§ Bull. Cal. Acad. i, 69.

|| Bull. Cal. Acad. i, 68.

¶ Bull. Cal. Acad. i, 182.

\*\* Bull. Tor. Club xiii, 217.

†† Bull. Cal. Acad. i, 183.

‡‡ W. Am. Sc. 157.



*Cardamine cardiophylla* Greene as well as the revived synonyms *C. integrifolia* (Nutt.) and *C. Californica* are all apparently forms of the varying *C. paucisecta* Benth. *C. cuneata* Greene known only in immature specimens may belong here also, but the foliage is more dissected. *C. integrifolia* (Nutt.) is apparently the oldest name.

*Streptanthus Parryi* Greene is *Caulanthus Lemmoni* Wats., the older name.

*Streptanthus niger*, *peramœnus*, *albidus*, *barbiger*, *Biolettii*, *pulchellus*, *Mildredæ*, and *secundus* Greene are nearly all separated by inconstant characters from *S. glandulosus*. Watson in one of his later papers reduced *peramœnus* and *albidus*; *pulchellus* and *secundus* are the same thing from the same locality.

*Thysanocarpus ramosus*\* Greene is *T. elegans* F. & M.

*Cerastium grande* Greene is certainly *C. maximum* Ledeb.

*Silene purpurata* Greene, by the description, seems to be *S. repens* Ledeb.

*Silene simulans* Greene is *S. laciniata* Cav.

*Alsinnella ciliata* Greene is *Sagina apetala* L.

*Paronychia pusilla* Greene is *Herniaria cinerea* L. another waif from the Mediterranean region. A second species *H. glabra* was collected by Mr. Congdon, near Darrah, in Mariposa County, some years ago. Mr. Greene might be forgiven for renaming the obscure weeds which make their advent into California if he would but acquire the knowledge necessary to place them in the proper genera.

*Tissa pallida*, *T. leucantha*, *T. Talinum*† & *T. valida*† Greene are forms of that species of which the oldest name is, apparently, *macrotheca*. *T. Talinum* and *T. valida* are perfectly inexcusable.

*Tissa Clevelandi* Greene is *rubra*, the perennial form.

*Tissa tenuis* Greene is *Lepigonum gracile* Wats. and both are probably referable to *diandra* and perhaps to still older names. The type of *tenuis* was collected at Alameda and Dr. Kellogg collected it at the same place more than ten years earlier. It often has four stamens, and is perhaps never truly apetalous; like *gracile* it has from one to four small, obovate, hyaline petals

\* Bull. Cal. Acad. ii, 330.

† Eryth. 106 and 107.

usually entirely obscured by the broad hyaline margin of the sepals. It is very common in sandy places in California and runs into many forms, as diverse in the size of petals and the markings of the seeds as any other species. Bentham & Hooker are probably right in considering the numerous species reducible to three or four, and so far at least as California is concerned all our forms are European, and either introduced or common to maritime shores.

*Viola pinetorum* Greene, is reduced by the author to *V. purpurea* Kell. It was described as "having truly violet colored petals; all other known species of the group being yellow-flowered." In *Flora Franciscana*, however, he reduces it without explanation to the yellow-flowered *V. Nuttallii* ~~*purpurea*~~.

*Viola Douglasii* Steud. is substituted for *V. chrysantha* Hook. on account of an older homonym; then as Philippi has named another species (from Chili) *V. chrysantha*, Mr. Greene furnishes that also with a new name, *V. Philippiana*. All this without troubling himself in the slightest degree about the validity of the species involved, and apparently without taking the trouble to notice the previous *V. Philippii* Leyb.

*Calyptridium* (*Spraguea*) *nudum* Greene is a condensed subalpine form of *Spraguea umbellata* Torr.

*Claytonia nubigena* Greene is a common form of *C. perfoliata* Donn.

*Sidalcea tenella* Greene is *S. Hartwegi* Gray.

*Sidalcea secundiflora* Greene is a variety of *S. diploscypha* Gray.

*Sidalcea campestris* Greene is founded on the sterile (male) plants of, apparently, *S. Oregana* Nutt.

The perennial species of *Sidalcea* are certainly not nearly so numerous as has been supposed. Long suites of specimens from many localities show that the differences relied upon as specific are far from constant. Even the generic type is becoming much weakened by forms in which the double series of anthers is much less evident. It is remarkable that *Sidalcea* should have been considered beakless when nearly every species is beaked more or less strongly. Mr. Greene, who has probably never seen the

figure in Ic. Mex. Ined.\* on which the species was founded, transfers the name *S. malveflora* (Moq. & Sesse) to what has been of late called *S. Neo-Mexicana* Gray and takes up *S. delphinifolia* Nutt. for the common species of the coast of California. From his remarks he appears to think that the original *S. malveflora* was glabrous, whereas the drawing shows it to have a copious spreading pubescence.

*Erodium Californicum* Greene was brought from Santa Cruz Island by Mr. Brandegee in 1888. It seems to be only a rank and vigorous *E. macrophyllum* Hook. & Arn. of which it has the glandular pubescence and exactly the fruit. *E. macrophyllum* has neither the habit nor the distribution of a native.

*Ptelea crenulata* Greene is *P. angustifolia* Benth.

*Ceanothus connivens* Greene is a hybrid of *C. cuneatus* & *prostratus*.

*Ceanothus rugosus* Greene is a hybrid of *C. velutinus* & *prostratus*.

*Ceanothus vestitus* Greene is one of the forms connecting too closely *C. cuneatus* and *C. Greggii*.

Up to date Mr. Greene is guilty of eighteen "new species" of *Lupinus*, including *L. adsurgens* & *L. sylvestris*† Drew, for the naming of which he was responsible. Three species he has himself reduced—*L. Franciscanus* Greene to *L. versicolor* Lindl., *L. adsurgens* to *L. latifolius* Agardh. and *L. sylvestris* to *L. albicaulis*. Dougl.

*Lupinus umbellatus*‡ Greene is *L. micranthus* Dougl.

*Lupinus capitatus* Greene seems to be *L. Sileri* Wats.

*Lupinus pachylobus* Greene is *L. bicolor* Lindl.

*Lupinus Pondii* Greene is a form of *L. Arizonicus* Wats.

*Lupinus carnosulus* Greene is *L. nanus* Dougl. In the original diagnosis Mr. Greene describes it as "with the habit of large states of *L. nanus* but very distinct, wanting the variegated or changeable petals and villous-edged keel of that species; the herbage fleshy as in *L. affinis*." An inspection of the type of *L. carnosulus* in the herbarium of the California Academy of

\* There are probably only two copies of this work in America, one in the library of the Gray Herbarium, the other in the library of Mr. Brandegee.

† Bull. Torr. Club. xvi, 150

‡ Bull. Cal. Acad. ii, 145.

Sciences shows that the plant is only slightly more fleshy than in typical *nanus*, which may perhaps be accounted for by its vicinity to the coast, that the keel is ciliate and that the upper half of the banner is white, becoming rose-purple in age.

The author's motive for making and reiterating statements of this kind which may be so readily disproved is a psychical problem past finding out.

The forms of *L. microcarpus* Sims approach *L. brevicaulis* Wats. very closely and Mr. Greene has not helped matters by creating *L. malacophyllus* between them.

The perennial Lupines of Mr. Greene are in even worse case. The trouble with them is that they are nearly all intermediates in groups of species already too nearly related, and extensive revisions with consultations of distant types are necessary to determine their true names.

*Amorpha hispidula* Greene is *A. Californica* Nutt. "The prickly-like glands interspersed among the depressed and sessile" are very common in glandular Leguminosæ. When, as nearly always happens in age, the upper part of the gland breaks away the remaining basal portion is the "depressed and sessile" one.

*Hosackia Veatchii* Greene, *Syrmatium dendroideum* Greene and *Syrmatium patens* Greene, are forms of *Hosackia glabra*.

*Hosackia nivea* Wats. is a synonym of *H. argyræa* Greene, but this did not prevent Mr. Greene from making a subsequent *Syrmatium niveum*. This last, however, as well as *S. ornithopus* Greene is too near *H. argophylla* Gray.

*Hosackia procumbens* Greene is apparently *H. sericea* Benth.

*Hosackia Guadalupensis* Greene and probably *H. occulta*\* Greene, described from seedling specimens without flowers or fruit, belong to *H. grandiflora* Benth.

*Hosackia macrantha* Greene and *Lotus leucophæus* Greene are both *Hosackia grandiflora* var. *anthylloides* Gray. Mr. Greene in the original description of *H. macrantha* discourses concerning the subulate glands—he calls them "foliaceous." They are alike in all the forms of *H. grandiflora* and very nearly so in all

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\* Bull. Cal. Acad. ii, 394. Mr. Greene in his enumeration of the species in Pitt. ii, 133-150, omits this name, although in the original description it is characterized as "this unquestionably new species."

the gland-stipular species, *i. e.*, the glands when young are subulate, the upper part breaking away later and leaving the more or less thickened base.

*Lotus humilis* Greene is *Hosackia maritima* Nutt. and *L. tomentellus* Greene probably belongs to the same species.

*Hosackia mollis* Greene is a form of *H. puberula* Benth.—both too near *H. Wrightii* Gray.

*Lotus hirtellus* Greene is *H. strigosa* Nutt.

*Lotus sulphureus* Greene is *Hosackia Heermanni* Dur. & Hilg. The species was described from the Tehachapi Range, and the "San Francisco sand hills" mentioned as a station is probably an error. It is thoroughly confluent with *H. Nevadensis* Greene and it will be sufficiently difficult to keep the form represented by these three names from *H. decumbens* on the one hand and *H. tomentosa* on the other. In correction of his extremely loose nomenclature Mr. Greene will perhaps be glad to learn that there is a *Lotus tomentosus* Rhode, in Schrad. Neue Journ. 1809, p. 42; a *Lotus macranthus*, Lowe, Novit. Flor. Mad. 546; and a *Lotus sulphureus* Boiss., Tchihatch. As. Min. Bot. 1, t. 1.

*Cerasus Californica* Greene is *Prunus emarginata* Dougl.

The types of Mr. Greene's two species of *Rosa*, *R. gratissima* & *R. Sonomensis*, have not been seen by the writer, but judging by the published character, even without taking into consideration the author's well-known capacity for finding characters which remain invisible to others, they cannot be maintained.

*Neillia capitata* Greene is *N. opulifolia* B. & H.

*Saxifraga malvacea* Greene is *S. Parryi* Gray.

*Heuchera maxima* Greene is *H. pilosissima* F. & M.

*Tellima nudicaulis* Greene is *Heuchera Williamsonii* \* Eaton.

*Ribes Mogollonicum* † Greene is *R. Wolfii* Rothrock.

*Ribes Marshallii* Greene is a large flowered *R. ambiguum* Wats. They are probably both forms of *R. Lobbii* which though found in Lake County has been omitted from Flora Franciscana.

*Ribes quercetorum* Greene seems hardly separable from *R. leptanthum*.

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\* Bot. Gaz. xv, 62; xvi, 237.

† Bull. Torr. Club viii, 121.

*Ribes velutinum* Greene is *R. leptanthum* var. *brachyanthum* Gray—the pubescent form.

*Ribes amictum* & *R. Victoris* Greene are two of the forms which Mr. Greene in addition to *R. Californicum* H. & A. and *R. subvestitum* H. & A. would separate from *R. Menziesii* though he thinks *R. Victoris* possibly identical with *R. occidentale* H. & A., “a shrub which cannot be identified by the very inadequate diagnosis given in the Botany of Beechey’s Voyage.” It seems not to have occurred to Mr. Greene that there are other means than these imperfect descriptions of verifying the species of Bentham & Hooker.

*Lythrum adsurgens* Greene is *L. Hyssoipifolia* L.

*Lythrum Sanfordi* Greene appears to be identical with the Chilean *L. albicaulis* Bert.

*Eucharidium Saxeanum* Greene is *E. Breweri* Gray. It is rather common on the eastern side of Mount Hamilton.

*Zauschneria latifolia*, *tomentella*, *villosa* & *cana* Greene are variations of one polymorphous species, the last and most diverse, *Z. cana*, is *Z. Californica* var. *microphylla* Gray. Mr. Greene says “there is every reason for thinking that the plant of the southern part of California, which Dr. Gray had named var. *microphylla* is the typical *Z. Californica*.”\* He had evidently never seen Presl’s plate which accords very much better with *Z. villosa* Greene.

*Oenothera Hilgardi*† Greene is *O. andina* Nutt.

*Oenothera Cedrosensis*‡ Greene is *O. cardiophylla* Torr.

*Oenothera nitida* Greene is a more glabrous form of *O. cheiranthifolia* Hornem. It is not uncommon mixed with the ordinary form, near the coast from San Francisco southward.

*Oenothera crassiuscula* Greene is *O. angelorum* Wats.

*Oenothera hirtella* Greene is *O. micrantha* Hornem.

*Oenothera Jepsoni*, *arguta*, & *depressa* Greene are forms separated from *O. biennis* by Mr. Greene along with the revived synonyms, *O. grandiflora* Ait. and *O. Hookeri* T. & G. *O. depressa* was described from a cultivated specimen as “pros-

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\* Pitt. 1, 27.

† Bull. Torr. Club. x, 41.

‡ Bull. Cal. Acad. i, 187.

trate, only the spicate ends assurgent." The plant in Montana from which the seeds were gathered was, however, according to the collector, entirely erect.

*Godetia micropetala* Greene is *G. quadrivulnera* (Dougl.) with depauperate corolla. Mr. Greene in *Flora Franciscana* says: "spike rather short," but his type shows it to be nearly a foot long with remote flowers.

*G. pulcherrima* Greene is what has been known as *G. Botta* Spach. Mr. Greene finds it quite different in color from typical *Æ. Botta*, but fails to explain how he came by his exact knowledge of the coloring of *Æ. Botta*. It is indeed too probable that a part of the southern *Æ. Botta* as received, belongs to *Æ. amœna* Lilj. and the remainder to *Æ. biloba* Wats. *Æ. pulcherrima* Greene is very common, ranging from Lake County to San Diego. It is not distinguishable by any character from entire-petaled forms of *Æ. biloba* and shares with it a somewhat inconstant character—the purple or lilac sepals—which is the most striking difference readily observable between forms of *Æ. amœna*, and these others.

*Godetia purpurea* Wats. of which Mr. Greene writes: "Mr. Watson attributes to this species two rows of seeds in each cell of the capsule. No such plant has been recognized by the present writer," is not uncommon in the Sacramento Valley. Mr. Greene will find it if he looks along the trenches by the side of the railway near Elmira. The character "two rows of seeds in each cell" is probably as inconstant as the pedicel of the *amœna* group. Specimens of what Mr. Greene would probably call *G. rubicunda* collected near Sonoma by John MacLean show two rows in their very large capsules.

*Sium heterophyllum* Greene is probably not a native species.

*Selinum eryngiifolium* Greene is a common form of *S. capitellatum* B. & H. with rather more dissected foliage.

*Galium buxifolium*\* Greene is *G. Catalinense* Gray.

*Galium flaccidum* Greene is *G. Californicum* F. & M.

*Galium Miguelense* Greene is *G. Nuttallii* Gray.

*Sambucus callicarpa* & *S. maritima* Greene = *S. glauca* Nutt. The diagnosis of *S. callicarpa* is a mixture of the charac-

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\* Bull. Cal. Acad. ii, 150.

ters of *S. glauca* and *S. racemosa*, but is principally of the first, and his type specimens are from trees of *S. glauca*. He says: "The arborescent habit, stipulate and often bipinnate leaves, but more than all the broad and flat rather than thyrsoïd inflorescence and fruit-clusters mark this [*S. callicarpa*] as a species very distinct from the Old World *S. racemosa*, in which latter the corolla lobes moreover are closely reflexed against the pedicel. The eastern shrub, *S. pubens*, is easily distinguishable from both by a character not hitherto mentioned, *i. e.*, the large, rounded and very conspicuous winter-buds. The red-berried elder of the northern woods from Oregon to Alaska is not *S. racemosa*, for it has, like our species, very ample and almost flat-topped cymes; but neither am I confident of its identity with *S. callicarpa*. Our tree has small winter-buds and is hardly in flower before April, putting forth its leaves in March."\*

Subsequently he redescribes the plant as *S. maritima*: "Though I named as the type of my *S. callicarpa* the beautiful, scarlet-berried elder common in California, and called *S. racemosa* in the State Survey Botany, the description of the trunk, foliage, etc., was drawn from fresh specimens of a tree which now proves by its mature fruit to be a wholly distinct and new species. Said trees, which, by their early flowering and general resemblance to the red-berried species, I had always supposed to be that, had always interested me deeply by their strangely maritime habit. They stand at only a few rods distance from a sand-beach of San Francisco Bay; and that in a depression which cannot more than equal the level of the salt water at less than the highest tide. \* \* \* By its early flowering and other peculiarities, it is clearly of that group which embraces *S. racemosa*, *callicarpa* and *melanocarpa*. That the American *S. pubens* is distinct from *racemosa* I indicated in the *Flora Franciscana*."†

This remarkable group of *Sambucus glauca* furnishing from the same stem type specimens of two species, both according to the author to be kept up, may be seen along the northern end of Shell Mound. It is not in danger, as one would infer from the author's language, of a bath of salt water. Mr. Greene evidently

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\* *Flora Franciscana*, 342.

† Pitt. ii, 297.



intends his first name to apply to our red-berried elder, because he mistook the trees for that species, describing them when in flower. Later when he found the fruit glaucous he gave them the second name.

*Valeriana rhombifolia* Greene is at Harvard credited to *V. scorpioides* DC.

*Grindelia Hendersoni* Greene is *G. Oregana* Gray.

*Grindelia lanata* Greene is the more pubescent form of *G. integrifolia* DC.

*Grindelia patens* Greene is *G. hirsutula* H. & A.

*Grindelia rubricaulis* DC. Prodr. v. 316, 1836, is taken up by Mr. Greene in place of *G. hirsutula* H. & A. Bot. Beech., 147. It has already been shown on a preceding page that the Californian part—not the supplement—of Botany Beechey, must have been printed simultaneously with the first volume of Hooker's Flora Boreali-Americana, printed in 1833. To adopt the true date of Hooker's Flora, and continue the obviously incorrect one of the early parts of Bot. Beechey admits apparently of the largest amount of changes possible. Mr. Greene's action tacitly infers gross injustice on the part of De Candolle's contemporaries. We shall be driven finally to settle these matters by affidavits from the printers or excerpts from ancient ledgers.

*Grindelia patens* Greene is *G. hirsutula* H. & A. As Mr. Greene had not access to the types how could he be certain that *G. rubricaulis* and *G. hirsutula* did not represent the two forms into which he would divide the received *G. hirsutula*?

*Hazardia detonsa*, *cana*, & *serrata* Greene are all the same species, *Diplostephium canum* Gray.

*Helianthella Nevadensis* \* Greene is *H. Californica* Gray.

*Viguiera Parishii* † Greene is *V. deltoidea* Gray.

*Madia hispida* Greene is *M. elegans*. Mr. Greene is in error in his statement that it flowers at a different season.

*Chenactis lacera* Greene is a pappose variety of *C. artemisiaefolia* Gray.

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\* Bull. Cal. Acad. i, 89.

† Bull. Torr. Club. ix, 15.

*Laphamia Peninsularis* Greene\* is *Perityle Fitchii* Gray.

*Senecio Blochmanæ* Greene is *S. Douglasii* DC.

*Prenanthes stricta* Greene is *Luina Piperi* Rob. Mr. Greene's name is the earlier, but it is a curious commentary on his attempt to separate the Cichoriaceæ as a distinct order from the other Compositæ that he should have referred a *Senecio* to *Prenanthes*. His latest attempt to settle its relationship is to put it into Cassini's "Psacalium," but as *Psacalium* is always reduced to *Cacalia* and *Cacalia* usually to *Senecio* he might as well have reduced it to that genus at once.

*Malacothrix altissima* † Greene seems to be only the inland form of *M. saxatilis* T. & G. A specimen collected on the Santa Lucia mountains and referred by Mr. Greene to *M. altissima* is certainly nothing but *saxatilis*. The type is from Tehachapi, and was collected by the writer.

*Malacothrix insularis* ‡ & *squalida* § Greene and *M. foliosa* Gray are forms of the same species.

*Stephanomeria virgata* Benth. *S. paniculata* & *exigua* Nutt. *S. coronaria* || & *tomentosa* ¶ Greene and "*Ptiloria*" *canescens* & *pleurocarpa* Greene, represent at the utmost three species, and they are so difficult to discriminate and so entangled with connecting forms that they may have to be reduced to one.

*Lobelia Rothrockii* Greene is the variety *serrata* of *Palmerella debilis* Gray.

*Downingia concolor*,\*\* *humilis*, *insignis*, *montana*, *ornatissima* & *tricolor* Greene are forms of a single polymorphous species. Three or four of them can often be collected in the same "hog-wallow." At Vanden Station, for instance, in the same late-dried depression, the writer collected *D. pulchella*, *D. ornatissima*, *D. concolor* & *D. humilis*.

*Howellia limosa* Greene is extremely like the terrestrial form of *H. aquatilis* Gray. The chief difference seems to be in the

\* Bull. Cal. Acad. i, 8.

† Bull. Cal. Acad. i, 195.

‡ Bull. Cal. Acad. i, 194.

§ Bull. Cal. Acad. ii, 152.

|| Bull. Cal. Acad. i, 194.

¶ Bull. Cal. Acad. ii, 152.

\*\* Bull. Cal. Acad. ii, 153.

smaller seeds of *H. limosa*, but those of the terrestrial form of *aquatis* are hardly known. A form of *limosa* was collected in May, 1892, in a trench by the side of the railway about a mile north of Suisun. The plants formed a matted mass several feet in length, and were fruiting abundantly from extremely minute cleistogamous flowers—no others were to be found. Mr. Greene's station was not far distant. Both the locality and the rarity of this plant show it to be in all probability a recent introduction.

*Arctostaphylos insularis*,\* *patula* & *media* Greene are like nearly all the recent species proposed, mere variations of the older ones of which several are maintained with difficulty.

*Rhododendron Sonomense* Greene is *R. occidentale* Gray.

*Pholisma depressum* Greene † is *P. arenarium* Nutt.

*Dodecatheon Clevelandii*, *Cusickii*, *cruciatum*, *patulum* and *pauciflorum*, are forms of *D. Meadia* L. If the circumscissile dehiscence of the capsule prevailing in most of the western forms of *Dodecatheon* be made a specific distinction, it was already named before Mr. Greene began, but it has been shown that this form of dehiscence grades into the ordinary one. ‡

*Gentiana superba*, Greene is credited at Harvard to *G. lanceolata* Griseb.

*Collomia diversifolia* Greene is a stout form of *C. heterophylla*. The type was collected by the writer.

*Gilia parvula* Greene is *G. viscidula* Gray.

*Navarretia microcarpa* Greene is *Gilia filicaulis* Torr.

*Navarretia prolifera* Greene is a large-flowered form of *Gilia divaricata*.

*Navarretia nigellæformis* Greene is a yellow-flowered form of *Gilia cotulæfolia*. It is common about Antioch and in Lake County, and has been collected at San Luis Obispo by Miss M. M. Miles.

*Navarretia subuligera*, *leptantha foliacea*, & *hamata* Greene are forms of *Gilia atractylodes*, some of them connecting rather closely with *G. viscidula*.

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\* Bull. Cal. Acad. ii, 494.

† Bull. Cal. Acad. i, 198.

‡ Zoe i, 19.

*Leptosiphon rosaceus* Greene is the well-known *Gilia androsacea* var. *rosacea* Gray, of the sand hills of San Francisco.

*Leptosiphon acicularis* Greene is the yellow-flowered form of *Gilia micrantha*. Mr. Greene's reasons as given by himself for neglecting the older names are not very convincing. His free use of the word "invariably" is calculated to alarm any one who knows of the almost infinite variety of forms belonging to *G. androsacea* and *G. micrantha*, for the consequences when Mr. Greene shall have been made acquainted with a score or two of them.

*Hesperochiron ciliatus* Greene is *H. pumilus*, Porter.

*Phacelia scabrella* Greene is *P. distans* Benth.

*Phacelia Arthuri* Greene was identified by Mr. Congdon\* with *P. platyloba* Gray.

*Phacelia suaveolens* Greene. This was described as having "4-seeded capsules," and the author in the note under the specific character says:† "It is another of those species which eliminate the boundaries of subgenera or sections; for it combines the capsule and seed of *Euphacelia* with the narrow elongated corolla of *Microgenetes*." By a fruiting fragment kindly placed at the writer's disposal by Mr. Greene it is found to belong to *Eutoca*. The fragment contained a number of empty capsules, and the four still retaining their seeds held eight, six, three, and two respectively, and examination of the empty capsules showed in the larger ones on each half-placenta the points of attachment of six or eight seeds. The author was therefore probably misled by the depauperate upper capsules. The fragment bore neither leaf nor flower, but the published character with the notes here given make it probable that it is *P. brachyloba* Gray, which was described from Monterey and not known farther north until last year, when it was found in great abundance on Tamalpais beyond the second summit.

*Phacelia rugulosa* & *P. leucantha* Lemmon in herb., Pitt. i, 175. These are respectively strict synonyms of *P. affinis* & *P. Orcuttiana* Gray, Supp. Syn. Fl. ii, part 1. This is one of the instances which serves to show that there are two sides to the question of

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\* Zoe ii, 125.

† Pitt. i, 223.

the justice or generosity of publishing herbarium names. Many botanists write names in their herbaria as a reminder to study such specimens in the future as time admits, and it is not at all probable that Mr. Lemmon, who is much more careful in such matters than Mr. Greene, would when he came to study the species have passed over the very accessible descriptions furnished by the Synoptical Flora.

*Convolvulus Binghamia* Greene\* is *C. sepium* L. It is common in the tule marshes of the lower Sacramento.

*Convolvulus macrostegius*† Greene is *C. occidentalis* Gray.

*Lycium Hassei* Greene is *L. Richii* Gray.

*Antirrhinum Kelloggii* Greene‡ is *A. strictum* Gray, not *A. Kingii* Watson, as referred in Supp. Syn. Fl. ii, 439. The author corrected his mistake.

*Collinsia stricta* Greene is evidently *C. tinctoria* Hartw.

*Collinsia arvensis* Greene is what is usually called *C. sparsiflora* F. & M. In some remarks on *C. Franciscana* in Zoe iii, 369, it was shown to be unsafe to separate forms from the type until the type itself was more fully described. The principal character on which *C. Franciscana* rested was its more numerous seeds, assuming that the typical form had but few. *C. stricta*, however, at least a specimen from Michener & Bioletti, labeled "*Collinsia stricta* Greene, No. 1662 a, South Los Guillos, March 13, 1892," has twelve ovules.

*Russellia retrorsa* Greene is *R. sarmentosa* Jacq.

*Pentstemon arenarius* Greene bears on the collector's label the words, "I think it is a variety of the very variable *Pentstemon deustus*. Prof. Gray."

*Pentstemon leucanthus* Greene is one of the narrow-leaved forms of *P. azureus* Benth.

*Pentstemon Sonomensis* & *Davidsonii* Greene are well-known forms of *Pentstemon Menziesii* Hook. The first has been for many years in the herbarium of the California Academy of Sciences, from Mt. St. Helena. Mr. Greene in describing it compared it with the sarmentose *P. corymbosus*. He attempts to

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\* Bull. Cal. Acad. ii, 417.

† Bull. Cal. Acad. i, 208.

‡ Bull. Torr. Club x, 126.

strengthen the species by remarks concerning differences of climate, but unaccountably omits to mention the fact that the flanks of Mt. St. Helena and of the Coast Range north of San Francisco generally, are notoriously foggy in summer, and therefore not the parched region his language would infer. *Pentstemon Davidsonii* is the Alpine form of the species. It was collected by Dr. Gustav Eisen on high mountains at the head of King's River in 1885; by Mr. H. W. Turner of the United States Geological Survey, at 10,000 feet, in Tuolumne County, July 1888; and by Mr. J. M. Hutchings on Mt. Conness in 1891. These last which are from the typical locality, show that Mr. Greene was either unfortunate in his specimens or careless in his statements.

*Diplacus arachnoideus*,\* *parviflorus* & *grandiflorus* Greene are forms of *Mimulus glutinosus* Wendl.

*Mimulus glaucescens*,† *arvensis*, *glareosus* & *nasutus*‡ Greene are forms of the polymorphous *M. luteus* L. *M. nasutus* in typical form might be maintained as a good variety if the forms connecting were not so numerous.

*Mimulus geniculatus* § Greene is *M. floribundus* Dougl.

*Castilleja hololeuca* Greene was erroneously described as having the calyx "deeply cleft on the upper side, merely lobed on the lower." The type shows it to be about equally cleft, and the species rests only on the slender basis of the pubescence, which is nearer *C. Pringlei* than *C. foliolosa*.

*Monardella discolor* Greene is *M. villosa* Benth. It is the same as Brandegee's No. 235, of 1882, from the Yakima Region, Northern Transcontinental Survey.

*Sphacele fragrans* Greene is *S. calycina* var. *Wallacei* Gray.

*Salvia Bernardina* || Greene is probably, as Gray thought, a hybrid.

*Stachys acuminata* ¶ Greene was by the author reduced to *S.*

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\* Bull. Cal. Acad. i, 210.

† Bull. Cal. Acad. i, 113.

‡ Bull. Cal. Acad. i, 112.

§ Bull. Cal. Acad. i, 280.

|| Bull. Cal. Acad. i, 211.

¶ Bull. Cal. Acad. ii, 410.

*Californica* Benth.—the latter itself considered by Dr. Gray only a form of *S. bullata* Benth.

*Chorizanthe Nortoni* Greene is a variety of *C. Douglasii* Benth.

*Eriogonum grande* & *rubescens* Greene are mere variations of *E. nudum* Dougl.

*Eriogonum molle* Greene described as "not in flower" has since been collected in better specimens and proves to be *E. giganteum* Wats.

*Eriogonum robustum* Greene\* is the form of *E. Lobbii* growing at lower elevation. The type of *E. robustum*, collected by the writer, was found at about 4,500 feet.

*Eriogonum elegans* Greene is one of the forms of either *E. gracile* Benth. or *E. Baileyi* Wats. *E. Baileyi* as everyone knows was formerly termed "*E. gracile* var. *effusum*," and there are numerous forms now known which can be referred equally well to either. Mr. Greene's reason for comparing it to the suffrutescent *E. saxatile* cannot be conjectured.

*Eriogonum agninum* Greene judging from the imperfect character is *E. gracile* var. *leucocladon* (*E. leucocladon* Benth.).

*Eriogonum Davidsonii* Greene Pitt. ii, 295 was reduced by the author in "Errata" a few pages further on in the line "*Eriogonum Davidsonii*=*E. molestum* Wats."

*Eriogonum taxifolium* Greene has by other botanists always been considered a form of *E. Wrightii* Torr.

*Pterostegia galioides*† Greene is *P. macroptera* Benth.

*Pterostegia fruticosa*‡ Greene (*Harfordia fruticosa*,† Greene & Parry) is apparently only an insular variety of the same.

*Atriplex dilatata* Greene is *A. Barclayana* (Benth.)

*Atriplex nodosa* Greene is *A. expansa* Wats. It was described from a single old and fragmentary specimen collected by the writer. *A. expansa* often shows two strikingly different forms of fruit in the same plant.

*Amarantus carneus* Greene is probably an introduced weed. It may be *A. polygonoides* L., though from the very imperfect

\* Bull. Cal. Acad. i, 126.

† Bull. Cal. Acad. i, 212-13.

‡ Proc. Dav. Acad. v, 26.

description one cannot be certain even that it belongs to *Amarantus*.

*Euphorbia Benedicta* Greene is *E. misera* Benth.

*Euphorbia velutina* \* Greene is *E. tomentulosa* Wats.

*E. Parishii*† Greene, described as "suffrutescent" and as having "the aspect of *E. polycarpa*, but the peculiar flowers of that very dissimilar species, *E. ocellata*, which is annual, with much larger, veiny leaves and round oval seeds," has in the typical specimen no root. Mr. Parish, who collected it, writes: "My own specimen is reduced by repeated division to a mere fragment but the root remains and is plainly annual."

In "West American Oaks" Mr. Greene by the information gained in one hasty trip, made at such a season of the year as to furnish him neither flowers nor mature fruit, reached conclusions the opposite of those held by Engelmann, which were the result of several seasons of field study and of a great mass of material from all parts of the country sent in answer to his call. Further study by botanists without the mania for new species which characterizes Mr. Greene is much more apt to reduce than increase the number recognized by Engelmann.

The white oak of the southern part of California was considered by Engelmann to belong to *Q. oblongifolia*. Mr. Greene separates it as a species, under the name *Q. Engelmanni* Greene.

As Mr. Greene's figures sufficiently show, *Quercus Douglasii* H. & A. as it goes south runs into forms which are differently placed by botanists either in *Q. Douglasii* or in *Q. oblongifolia* (*Q. Engelmanni*), and the first duty of an investigator of our oaks is to show that they are not northern and southern forms of the same species. In a climate like that of California the question of deciduous or persistent leaves makes very little showing in the matter.

*Quercus McDonaldi* Greene if separable from *Q. oblongifolia* cannot be held distinct from forms of *Q. undulata* Torr. such for instance as the one taken up by Mr. Greene under the name *Quercus venustula*.

*Quercus McDonaldi* var. *elegantula* Greene was admitted by

\* Bull. Cal. Acad. ii, 57.

† Bull. Cal. Acad. ii, 56.



the author to be a hybrid between *Q. Engelmanni* & *Q. dumosa*. In this he may or may not be correct. There are large trees of the same form near Escondido, San Diego County.

*Quercus turbinata* Greene is of course a form of *Q. pungens* Liebm., itself considered by Dr. Engelmann only a variety of *Q. undulata*. The drawing represents either an extreme, unusual form, or the proportion between the acorn and the cup is not correctly shown. The specimens in the herbarium of the California Academy of Sciences collected at the same time and place by Mr. Dunn have longer cups and acorns one-fourth shorter.

*Quercus parvula* Greene is *Q. Wislizeni* DC.

*Quercus Gilberti* Greene founded inexcusably on a sterile branch has been since investigated by a botanist resident in the vicinity and found to be *Q. Garryana* Dougl. as is also of course *Q. Jacobi* R. Br. which Mr. Greene would revive.

*Quercus dumosa* var. *polycarpa* Greene was admitted by the author to be only an abnormal form.

In a previous notice\* of the West American Oaks it has already been shown how in attempting to re-establish *Quercus vaccinifolia* Kell. Mr. Greene falsified the record perhaps inadvertently, and described the shrub as "very leafy and its small entire leaves, these and its young branches being wholly destitute of the fulvous lepidote pubescence of *Q. chrysolepis*,"† though the original description‡ and painting of Dr. Kellogg were perfectly familiar to him.

*Allium dichlamydeum* Greene is *A. serratum* Wats. Mr. Greene failed to describe the bulb-coats for some reason, though it could not have been for lack of material, as it grows abundantly in San Francisco where he collected it. The reticulation is much more exactly typical than that of the form found in the interior.

The two species of Muilla proposed by Mr. Greene *M. transmontana* and *M. coronata* differ from *M. maritima* only in their

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\* Zoe i, 156-9.

† West American Oaks, 45.

‡ Proc. Cal. Acad. i, 96, (p. 106, 2nd edition). "Leaves annual, coriaceous, small, oblong-ovate, acute, sub-mucronate, somewhat obtuse at base; glabrous above, reticulate; fuscous and stellate-pubescent beneath."

filaments. In the Botany of California these are described as filiform, which is probably never the case—they are thickened toward the base and more or less deltoid-dilated in all the forms found about the Bay of San Francisco. While it is possible that one of Mr. Greene's species may be maintained it is much more to be suspected that these forms, alike almost to the minutest particular in all other respects, will prove to be filament variations of the original.

*Bloomeria montana*\* Greene is *B. aurea* Kell.

*Brevoortia venusta* Greene, according to Mr. Carl Purdy who discovered it, is a hybrid between *Brevoortia Ida-Maia* and *Brodiaea congesta*.

*Brodiaea insularis*† Greene is *B. capitata* Benth.

*Triteleia candida*‡ Greene is a not uncommon white form of *Brodiaea laxa*.

*Triteleia lugens*§ Greene is a form of *Brodiaea xiioides* with the appendages to the filaments shorter than usual.

*Triteleia lilacina*|| Greene, known only in a single imperfect specimen collected by the writer, was not well described. It differs from typical *Brodiaea lactea* only in the filaments above the membranous expansion adnate to the tube. In *T. lilacina* the membranous margin is nearly obsolete in the free part, while in the ordinary form it is continued in triangular form nearly to the top of the filament. Some specimens just received from Mrs. M. E. P. McCowen, of Ukiah, are exactly intermediate between typical *lactea* and *lilacina*.

*Hookera leptandra* Greene, from the description, is a form of *B. grandiflora*.

*Hookera rosea*¶ & *Orcuttii*¶ Greene as well as several species by other recent authors, will certainly be found untenable. They are all founded on the presence or absence of staminodia, appendages to the filament, or slight variations in their length. It seems even to be the opinion of some that the shape of the staminodia, more or less notched as they approach the anther form, entire or acuminate as they recede, is sufficient warrant for the separation of species.

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\* Bull. Cal. Acad. i, 281.

† Bull. Cal. Acad. ii, 139.

|| Bull. Cal. Acad. ii, 143.

† Bull. Cal. Acad. ii, 134.

§ Bull. Cal. Acad. ii, 142.

¶ Bull. Cal. Acad. ii, 137-8.

Mr. Orcutt, who however regards "*Hookera Orcuttii*" as a valid species, has made some observations on the staminodia of *Brodiaea minor* that are of interest. He says: "In examining a large number of the flowers of *Hookera minor*, Britten, in the field this spring, I was somewhat surprised to find numerous specimens in which the staminodia were changed to perfect fertile stamens. The first instance noticed was in a flower evidently injured by some insect, but so many examples were found later, where the staminodia were partially or wholly changed into anther-bearing stamens, that I cannot ascribe it to the work of insects. This illustrates how little value can be placed in this genus on the unreliable characters of the stamens and staminodia."\*

The characters upon which Mr. Greene would separate his "*Unifolium liliaceum*" from *Smilacina stellata* Desf. or *S. sessilifolia* Wats., it is difficult to say from which for they are not easily kept apart, are not at all constant. They vary much in different climates and exposures, as Mr. Greene in effect admits when at Lake Pend d'Oreille "where in deep shades of fir and arbor vitæ one meets with plenty of *U. sessilifolium*; and here too outside of and above the wet woods, on open ground and in dry soil, grows the unmistakable *U. stellatum*."† Miss Eastwood has carefully observed *Smilacina stellata* as it occurs in Colorado, and finds the grown but unripe fruit dark green with darker bands; the ripe fruit clear bright red. The distichous zigzag stem and plicate leaves are not constant in any of the forms.

*Zygadenus porrifolius* Greene ‡ is *Z. elegans* Pursh. Mr. Greene says "none of the segments are unguiculate or much contracted at base," but the type shows that the inner segments are abruptly contracted into a broad claw.

*Calochortus amænus* Greene, although compared by the author with the yellow-flowered and much more distant *C. pulchellus*, can hardly be considered more than a rose-colored variety of *C. albus*. The color is not uncommon in typical *C. albus*, but the gland is lower and its scales crisped with shorter hairs.

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\* West. Am. Scientist vi, 63.

† Pitt. ii, 33.

‡ Bull. Torr. Club. viii, 123.

*Calochortus Plummeræ* Greene is evidently *C. Weedii* var. *purpurascens* Watson.

*Calochortus excavatus* Greene is a form of *C. Nuttallii* T. & G. which is rather common in Nevada.

*Calochortus invenustus* Greene has not been accessible to me. It may be *C. flexuosus* or *C. Palmeri*, both of which have been found not very far away. It might be well for Mr. Greene, before making any more species on such grounds, to read with care some recent observations by S. B. Parish on the variation not only of the markings but of the gland.\*

If *Tradescantia tuberosa*† Greene were a good species it would yet have, under the rule by which the author changed *Horkelia parviflora* Lehm. to *Potentilla Andersoni*‡ Greene, to suffer eclipse on account of the previous *T. tuberosa* Roxb.

*Sagittaria Sanfordi* Greene collected first in the sloughs about the city of Stockton and since that time on the margins of pools along the county road between Lathrop and Banta was so imperfectly described by the author that even the section to which it belonged could not be made out. It proves to belong to the second division of the genus as formulated by Micheli. The pedicels of the female flowers are much thickened (the flowers are white), and the lamina of the leaf often considerably expanded. It has not the appearance nor the distribution of an indigenous plant, but has not so far been identified with any foreign one.

*Juncus uncialis* Greene has been collected by the writer at various places, including the locality at which the type was found. It is certainly *J. triformis* var. *uniflorus* Engelm. (*J. segetalis* Engelm.). The seeds in our specimens are faintly ribbed and cross-lined. The author will find that the degree of maturity of the seeds has much to do with the distinctness of their markings.

*Cupressus Arizonica* § Greene is not usually considered distinct from *C. Guadalupensis* Watson.

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\* Zoe iii, 352-4.

† Botanical Gazette vi, 185.

‡ Pitt. i, 104.

§ Bull. Torr. Club ix, 64.

## A NEW SUBSPECIES OF CEROPLASTES FROM MEXICO.

BY T. D. A. COCKERELL.

In Zoe, Vol. iii, Oct. 1892, Prof. C. H. Tyler Townsend describes, without naming, a *Ceroplastes* found by Dr. A. Dugès at Guanajuato, Mexico, on *Bignonia* and *Chrysanthemum*. Prof. Townsend has now kindly sent me two examples of this *Ceroplastes*, with the suggestion that if new, the species might be called *C. cistudiformis*. I have adopted this name, while regarding the insect as hardly a distinct species, but rather a subspecies of *C. psidii*, Chavannes, 1848.

CEROPLASTES PSIDII CISTUDIFORMIS, subsp. nov.

*Scale*: (largest specimen) length  $7\frac{1}{4}$  mm., breadth 6 mm., alt.  $4\frac{1}{4}$  mm. Color pale grey, with a slightly pink tinge at sides. Each cereous plate with numerous radiating fine blackish lines, and the lateral plates with two not very well-defined concentric lines. Below the nucleus of each lateral and terminal plate, the margin is broadly yellowish-white, without marks; these broadly triangular yellowish-white portions are separated above from the rest of the scale by black bands, which become evanescent towards the nuclei of the plates. The central plate has stronger radiating lines or bands at intervals, giving it the superficial appearance of being divided into several, as is the case in *C. janeirensis* and *psidii*.

The plate-nuclei are small, blackish, with the usual white secretion in the centre. That of the dorsal or central plate is rather large. Inside of the (cereous) scale pale ochreous, the divisions between the plates marked with purplish-brown.

Dorsal plate approximately circular, its posterior half strongly gibbous in both the specimens.

Anterior end with a single plate resembling the adjacent lateral. Each side with two approximately square lateral plates.

Posterior end with a very large broad compound plate, with two distinct nuclei, and an obscure third one between them.

One of the specimens contained the desiccated body of the ♀. The skin (corresponding to the "scale" of a *Lecanium*) is yellow

by transmitted light, with many scattered black (as they appear) gland-dots.

*Adult* ♀, placed in caustic soda, appears crimson, and stains the liquid.

The legs are very small, red-brown. Tibia about one quarter longer than tarsus. Femur about one-third longer than tibia. Tarsal knobbed hairs well-developed. The claw appears as if bulbous at the tip, but this is certainly due to the large bulbous digitules, as in *psidii*.

Compared with the figure of *C. psidii* given by Signoret, the present subspecies seems very different; but when we come to compare the characters in detail, it is apparent that the differences are those of degree rather than of kind, so that it is hard to accord to the Mexican form more than subspecific rank. *C. psidii* was found at Rio Janeiro, and is probably not to be separated as a species from *C. janeirensis*, Gray, 1828.

The present insect belongs to a group of *Ceroplastes* which is characteristic of the neotropical region, and includes the following species: *C. jamaicensis*, White (Jamaica); *C. cirripediformis*, Comst. (Jamaica, Florida); *C. denudatus*, Ckll., n. sp. (Antigua); *C. depressus*, Ckll., n. sp. (Jamaica); *C. janeirensis*, Gray (Brazil); *C. plumbaginis*, Ckll., n. sp. (Antigua); *C. psidii*, Chav. (Brazil); and perhaps *C. chilensis*, Gray. The three new species mentioned will be described elsewhere.

INSTITUTE OF JAMAICA, March 7, 1893.

## RECENT LITERATURE.

E. STRASBURGER: Histologische Beiträge, Heft. iv. *Ueber das Verhalten des Pollens und die Befruchtungs—vorgänge bei den Gymnospermen. Schwärmsporen, Gameten, pflanzliche Spermatozoiden, und das Wesen der Befruchtung.*—Jena, 1892.

As new facts are brought to light we are constantly obliged to alter our views. Nowhere is this truer than in regard to the structure and functions of the plant-cell. With the marvelous advances made in histological methods, more and more accurate information concerning the minutest details of cell-structure is being brought forward, and this frequently involves material changes in statements hitherto unchallenged.

The extremely interesting and valuable work before us illustrates this most strikingly. Probably no living botanist has contributed so much to our knowledge of the plant-cell as Strasburger, and any statements that come from him on this subject bear the stamp of authority; yet in the present work he has found it necessary to modify very substantially some of his earlier published statements. The work was evidently inspired largely by the recent remarkable discoveries of Guignard, and to some extent also by important researches by Belajeff.

The volume before us is divided into two parts; the first deals with the development of the pollen and the process of fertilization in Gymnosperms; the second, with a comparative study of the zoospores of algæ and spermatozoids, and studies in fertilization in various groups of plants.

Until very recently it was supposed that in the Gymnosperms, with the exception of the Cycads, that but two cells were formed in the ripe pollen-spore, and that the nucleus of the larger one which forms the pollen-tube, was the direct agent in fertilization. Belajeff\* demonstrated that in *Taxus* it was the smaller cell that represented the fertilizing element, and Strasburger now finds that this is true also in other Gymnosperms. He also finds that in a number of forms examined, e. g., *Larix*, *Picea*, *Pinus*, *Ginkgo*, that three cells are successively cut off from the body of

\*"Zur Lehre von den Pollenschläuchen der Gymnospermen." Ber. der Deutschen botanischen Gesellschaft—1891—Bd. ix, p. 280.

the spore, but that of these three usually but one persists, the first two formed being disorganized soon after they are cut off, so that in the ripe spore but one of these is to be readily seen. This small cell he considers homologous with the antheridium of the heterosporous Pteridophytes. This antheridial cell often divides into two, a small stalk-cell, and a larger one which represents the real generative part. He found that wherever this antheridial body was pluricellular, that it was always formed before the dehiscence of the sporangium.

As the pollen-tube grows, the generative cell of the antheridium becomes detached and passes down the pollen-tube, where it divides into two cells which must be regarded as homologous with the sperm-cells of the lower archegoniates. In the Cupressineæ both cells are functional, and thus two archegonia may be fertilized by a single pollen-tube; in the Abietineæ, however, only one of the two sperm-cells appears to be functional. In the meantime the nucleus of the pollen-tube has also divided, but these nuclei take no apparent part in the process of fertilization, contrary to the earlier views of Strasburger and others. Fertilization is effected by the discharge of the contents of the generative cell through the end of the pollen-tube into the archegonium.

From a study of the three genera of the Gnetaceæ—*Gnetum*, *Ephedra*, and *Welwitschia*, our author concludes that they represent the end members of three separate lines of development within the Gnetaceæ, which together with the other Gymnosperms have had a common origin lower down in the system.

After a careful study of the alleged differences in the male and female nuclei with reference to different stains, he comes to the conclusion that this difference depends entirely upon the amount of cytoplasm taken up by the nucleus for its nourishment. In all cases he claims that the nuclein itself is "kyanophil"—that is, has a special avidity for blue stains, when compared with the cytoplasm; in all cases during nuclear-division the nuclear-segments are distinctly kyanophil. He therefore concludes that when the female nucleus is erythrophil it is due to the presence in it of unassimilated cytoplasm.

The second part of the work deals with the formation and structure of zoospores and spermatozoids, and the process of fertil-



ization. The opening pages review Guignard's discovery of the "attraction spheres" and "centrosomes," structures long known in animal cells, but not hitherto certainly demonstrated in those of plants. These Strasburger regards as essential constituents of the cell, and therefore assumes that they must take part in fertilization, which can no longer be regarded as consisting in the union of the sexual nuclei alone.

Before passing to the consideration of the zoospores the author describes for the first time the occurrence of the attraction spheres in an alga—*Sphacelaria scoparia*—in which he found these easily demonstrable, and concludes as they have been found in so many widely diverse forms, that they are probably always present when there is a separation of the protoplasm into cytoplasm and nucleus. For the protoplasm radiating from the centrosomes, and that composing the spindle-fibres and connecting threads of the karyokinetic figures, he proposes the name "kinoplasm," and supposes it to play an important part in nuclear division.

The development of the zoospores was carefully studied in a number of algæ belonging to different groups. The most important conclusions reached were that the transparent end of the zoospore is composed of kinoplasm that gives rise to the cilia which are formed as outgrowths from it. The envelope in which the zoospores are often contained when first ejected from the mother-cell, is the outer protoplasmic layer (*Hautschicht*) of the mother-cell, and not part of the cell-wall as hitherto supposed.

Comparing the development of the non-sexual zoospores with that of the gametes or sexual ones, and also of the spermatozooids of higher cryptogams, he points out clearly the common nature of all these forms. In *Chara fragilis*, according to his account, the forward, cilia-bearing coils of the spermatozoid, originate as a cytoplasmic appendage of the nucleus, and the hinder coil is also of cytoplasmic origin, and corresponds to the hinder granular part of a zoospore. Only the middle coil is composed of nuclear substance, instead of the whole body of the spermatozoid as has been supposed. The forward coil gives rise to the cilia in the same way as the clear forward end of a zoospore does, and like that he considers this to be composed of kinoplasm. In mosses and ferns, only the small forward coils of the spermato-

zoid are cytoplasmic, while the whole of the large posterior coils is nuclear. The vesicle always attached to these is supposed to be homologous with the posterior part of the body of the spermatozoid of *Chara*, or the granular hinder part of the body of a zoospore.

While he was unable to demonstrate it, he considers it extremely probable that the kinoplasm of the forward part of the spermatozoid contains the centrosomes which are thus transferred to the egg.

In regard to the part which each element plays in the act of fertilization, Strasburger comes to the conclusion that, as Weismann believes, the nuclei are the direct agents of hereditary transmission. As to the centrospheres and kinoplasm, the former are supposed by our author to represent "the kinetic centres from which the impulses for nuclear division, and to a certain extent for cell-division, proceed." The kinoplasm "we consider as the conducting substance for the impulses that radiate from nucleus and centrospheres, and represents the specific motile element in the protoplasm." With each cell-division this kinoplasm is supposed also to divide.

The name proposed by Sachs, "Energid," is adopted for that unit composed of nucleus, centrospheres, and kinoplasm.

He is inclined to give up the view that in the resting nucleus the segments are separated, and to adopt his earlier view that they anastomose so as to form a net-work with no free ends. As an argument against the autonomy of the segments in the resting nucleus, the sudden change in their number which sometimes occurs is cited.

The conclusion finally reached is that the essence of fertilization consists of the introduction into the "entwicklungsfähig" egg of the active "energid" through which the rapid division of the egg is inaugurated.

DOUGLAS H. CAMPBELL.

## PROCEEDINGS OF SOCIETIES.

CALIFORNIA ACADEMY OF SCIENCES. *February 6, 1893.*  
President Harkness in the chair.

Additions to the museum were reported from N. A. Freeman, G. C. Duncan, J. Anderson, John Hemsley, H. N. Cook, J. Z. Davis, Rev. F. H. Wales, C. P. Nettleton, J. H. Cluff, James E. Fowler, T. K. Couperus.

The Librarian reported 225 additions to the library.

Mr. W. L. Watts read a paper on "Natural Gas in the San Joaquin Valley."

Mr. W. S. Chapman called attention to the fact that a bill had been introduced in Congress to contract the limits of the Yosemite Park Reservation, and moved that a committee be appointed to prepare resolutions requesting the Senators and Members of Congress from this State to use their utmost endeavors to preserve the present limits of the Reservation. Messrs. Chapman, Eisen, Hittell, and McDonald were appointed.

Dr. Eisen read a paper on "The Preservation of Game in the Sierra Nevada."

*March 6, 1893.* President Harkness in the chair.

Additions to the museum were reported from W. H. Shockley, Mrs. E. L. G. Steele, W. L. Watts, Miss Anna Hewston, J. M. Hahn, C. E. Manning, D. T. Hughes, Captain Praetz, Charles A. Keeler.

The Librarian reported 234 additions to the library.

A vote of thanks was tendered to Mr. D. T. Hughes for his valuable donation of a collection of butterflies from Columbia.

Mr. George H. Ashley read a paper on "An Illustration of the Flexure of Rock."

Dr. H. H. Behr read a paper on "The Relations Between Butterflies and Plants."

Mr. Walter E. Bryant read a paper descriptive of new mammals from Lower California, with exhibition of specimens.

*April 3, 1893.* President Harkness in the chair.

Dr. J. C. Branner, Prof. J. P. Smith, Mr. Marsden Manson, and Prof. W. R. Dudley, were elected to resident membership.

Additions to the museum were reported from Mr. Stone, William H. Shockley, Walter E. Bryant, E. F. Lorquin.

Two hundred and forty-five additions to the library were reported.

Mr. W. L. Watts read a paper on "Subterranean Air Currents in the Sacramento Valley."

Mr. Walter E. Bryant read a paper on "Notes on the Food of Birds."

Dr. Gustav Eisen made some remarks on a dwarf Chinese lily and spoke on the dwarfing of plants in general.

CALIFORNIA BOTANICAL CLUB. *March 4, 1893.* Miss Manning in the chair.

The following were elected to membership: Prof. Moses Craig, Miss May Belle Church, Miss M. E. B. Norton, Miss Alice Mills, W. Vortriede, H. F. Meier, A. C. Zeig, Miss H. A. Spaulding.

The following were elected officers for the ensuing year:

President—Prof. W. R. Dudley.

Vice-President—S. B. Parish.

Secretary—Frank H. Vaslit.

Treasurer—Miss A. M. Manning.

Librarian—Mrs. K. Brandegee.

Curator—Miss E. G. Britton.

Councilors—Mrs. C. E. Miller, Miss S. W. Scruggs, Miss E. J. Arnold.

The annual report of the Treasurer was read showing \$57.25 on hand.

CALIFORNIA ZOOLOGICAL CLUB. *February 3, 1893.* Vice-President, Walter E. Bryant, in the chair.

Officers for the ensuing year were elected as follows:

President—Dr. J. G. Cooper.

Vice-President—Dr. Gustav Eisen.

Secretary—Miss E. A. McIlriach.

Treasurer—T. S. Brandegee.

Curator—E. C. Van Dyke.

Councilors—Miss Emily I. Wade, W. W. Price, Miss Lillie J. Martin, Charles Fuchs.

Dr. Cooper read a paper on "The Shells of the Gulf of California."

*March 31, 1893.* President Cooper in the chair.

Dr. Eisen read a paper on "The Anatomy of Certain Earth-worms."

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Alphonse de Candolle died on the fourth day April, 1893, in the eighty-seventh year of his age. The whole botanical world feels his loss.

Dr. George Vasey, Chief Botanist of the Department of Agriculture at Washington, died at his home on March 4, 1893. His specialty was Grasses, but he contributed also to other departments of Botany. For twenty-one years he was Curator of the National Herbarium and his influence has been felt throughout the whole country.

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# ZOE

## A BIOLOGICAL JOURNAL

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VOL. IV.

JULY, 1893.

No. 2.

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### LIST OF PLANTS COLLECTED IN SOUTHEASTERN UTAH, WITH NOTES AND DESCRIPTIONS OF NEW SPECIES.

BY ALICE EASTWOOD.

1. *DELPHINIUM SCAPOSUM* Greene. Widely distributed through the region. Collected near Moab, along McElmo Creek, and at Mancos.
2. *BERBERIS FREMONTI* Torr. Collected near Moab, across the Grand River, in fruit. It grows along the rocky sides of the cañon. The plants were covered with a scale insect. The fruit is a berry containing no juice. The loose coat encloses about ten or twelve seeds. It was also collected in flower between Hatch's Wash and Monticello; but the amount of fruit is much less than the quantity of flowers. In the latter locality it grew along cliffs near the bed of streams that in May were dry.
3. *ARGEMONE PLATYCERAS* Link & Otto. A peculiar, rather sickly-looking plant was collected at Moab, with narrowly oblong leaves, very spiny, but not in the least hispid, flowers not an inch in diameter, fruit also small, but not ripe, and so not in a fit condition to describe.
4. *DRABA CAROLINIANA* Walt. var. *MICRANTHA* Gray. Found under sagebrush and pifions from Grand Junction to Mancos.
5. *ARABIS PULCHRA* M. E. Jones. This was noted in several places along the route. It was collected in a cañon between Hatch's Wash and Monticello.
6. *LEPIDIUM MONTANUM* Nutt. This grew in abundance in Hatch's Wash under the sagebrush and at other places along the road. I believe, as Professor Jones, that there is no real dis-

inction between this and *L. alyssoides*; for I find myself always in doubt concerning certain plants.

7. *LESQUERELLA MONTANA* Watson. This is not uncommon through southeastern Utah, and is usually found under the cedars and piñons.

8. *ERYSIMUM ASPERUM* DC. A few plants were noticed in a rocky cañon. They had shorter pods than any before seen.

9. *SISYMBRIUM LINIFOLIUM* Nutt. This was seen here and there through the region, on the mesas.

10. *STREPTANTHUS CORDATUS* Nutt. This was generally found on cedar-covered mesas.

11. *STREPTANTHUS LONGIROSTRIS* Watson. Reported in the general notes of a trip through southeastern Utah, Zoe iii, 4, as *Arabis longirostris* Watson. Thompson's Springs. It is common on the adobe desert and also on the mesas.

12. *THELYPODIUM AMBIGUUM* Watson. Thompson's Springs.

13. *THELYPODIUM AUREUM* Eastwood. Along McElmo Creek. Most common at Mancos, where the type was collected.

14. *BISCUTELLA WISLIZENI* Benth. & Hook. On a sandy flat in Court House Wash, and along McElmo Creek in a similar situation.

15. *CLEOMELLA PLOCASPERMA* Watson. The stamens surpass the petals, the pedicels are horizontal and about as long as the deflexed stipe, the seeds are not tessellated, but may not be sufficiently ripe. In all other characteristics it resembles the above-named species. It is not *C. oöcarpa* as that species is represented in the Herbarium of the California Academy of Sciences. Collected between Thompson's Springs and Moab.

16. *POLYGALA ACANTHOCLADA* Gray. This spiny plant was collected in Montezuma Cañon on a rocky hill.

17. *MALVASTRUM LEPTOPHYLLUM* Gray. Collected in Court House Wash and along McElmo Creek.

18. *SPHÆRALCEA MUNROANA* Spach. Collected after leaving Moab, a form with light pink flowers. The red-flowered form is common through the whole region.

19. *LINUM RIGIDUM* Pursh. This was quite abundant in the sandy bottom near the Grand River. It has taller and more diffuse stems than the Grand Junction plant, and the flowers are larger and lighter in color.

20. *GLOSSOPETALON SPINESCENS* Gray. This is not plentiful in any one locality, but seems to be widely distributed through the section.

21. *NEGUNDO ACEROIDES* Moench. Common along Montezuma Creek, but not at the lower end.

22. *RHUS CANADENSIS* Marsh. This differs from the ordinary form of var. *trilobata* in that the leaves are simply crenate. It was collected in Court House Wash.

23. *ASTRAGALUS AMPHIOXYS* Gray. Court House Wash, McElmo Creek, and Montezuma Cañon. The most widely-distributed *Astragalus* of the region.

24. *ASTRAGALUS BIGELOVII* Gray. Usually found on piñon and cedar covered mesas.

25. *ASTRAGALUS GEYERI* Gray. Court House Wash.

26. *ASTRAGALUS HAYDENIANUS* Gray. Montezuma Creek.

27. *ASTRAGALUS LONCHOCARPUS* Torr.(?) Court House Wash.

28. *ASTRAGALUS SCAPOSUS* Gray. McElmo Creek.

29. *ASTRAGALUS PICTUS* Gray var. *ANGUSTUS* Jones. Montezuma Creek.

30. *ASTRAGALUS PREUSSII* Gray. Common at Moab.

31. ——— var. *SULCATUS* Jones. Cane's Spring.

32. *ASTRAGALUS DESPERATUS* Jones. McElmo Creek; San Juan River.

33. *ASTRAGALUS PALANS* Jones. Montezuma Creek.

34. *ASTRAGALUS COLTONI* Jones. Court House Wash.

35. ——— var. *FOLIOSUS* Jones. This is the form found at Monticello. It was collected in flower and green fruit.

36. *ASTRAGALUS PATTERSONI* Gray. This species seems to be widely distributed on the western slope, growing in alkaline soil.



37. *CÆSALPINIA repens* n. sp. Perennial, 9 to 13 cm. high, from slender, woody, creeping rootstocks; leaves and peduncles crowded on a short stem, canescent with short, curled hairs; leaves with from 5 to 7 pinnæ, leaflets 4 to 6 closely appressed, nerveless, with a few scattered, depressed glands varying in shape, usually irregular in outline (many leaflets are without the glands); stipules ovate-acuminate, petioles ribbed, a little longer than the blade, with several long, lax bristles where the pinnæ join the axis, and one at the base of each leaflet; peduncles stout, ribbed, surpassing the leaves, covered closely with the short, white hairs, and with occasional longer ones similar to the lax bristles on the leaves; flowers at first erect, closely clustered, pedicels becoming deflexed and distant in the fruiting, elongating raceme; four upper sepals lanceolate, lowest oblanceolate, covered with longer white hairs than the rest of the plant; without glands, as is also the corolla; petals surpassing the sepals, obovate, tapering to the short claw, 8 to 12 mm. long, 3 mm. broad, smooth except the vexillum, which has a broad, hairy claw; stamens with filaments about 10 mm. long, broadening at base, smooth above, ciliate with blunt, coarse hairs below, densest at the base; style cylindrical, broadening at the base, and to a less degree at the ciliate campanulate stigma, which is slightly hairy below; legume at first canescent with short, curled hairs, orbicular to obovate; in age with hairs so scattered that it is no longer canescent, becoming reticulate with prominent transverse veins, flat, with a thickened margin, varying from orbicular to elliptical and oblong, usually abruptly pointed with the persistent style, entirely without glands,  $1\frac{1}{2}$  to 3 cm. long,  $1\frac{1}{2}$  to 2 cm. broad; seeds usually two. This grew in sandy soil, and formed loosely-spreading mats. It was collected in Court House Wash, near where it comes into the Grand River, on the opposite side from Moab, in southeastern Utah, May 26, 1892.

The pod is very different in appearance from that of others of this genus. The character of its glands excludes it from the sections proposed by E. M. Fisher in his recent revision of *Hoffmanseggia*. Since he has with good reason reduced *Hoffmanseggia* to *Cæsalpinia* in Bot. Gaz. xviii, 4, this Utah plant

which by the old classification would be *Hoffmanseggia* becomes *Cæsalpinia*. Plate XXVI.\*

38. *LATHYRUS PALUSTER* L. Along the bottom of Montezuma Creek.

39. *LUPINUS SHOCKLEYI* Watson. Scarce. On the road from Thompson's Springs to Moab.

40. *LUPINUS PUSILLUS* Pursh. Abundant. But not seen after leaving Moab.

41. *PSORALEA CASTOREA* Watson. Along the side of a sandy wash.

42. *TRIFOLIUM PLUMMERÆ* Watson. Under the cedars and piñons at the head of Montezuma Cañon.

43. *AMELANCHIER ALNIFOLIA* Nutt. This is a peculiar form of this widely distributed species, collected in Court House Wash. It differs from the form common in Colorado, in the leaves smaller, less veiny, and more glossy on the upper surface, the branches are straggling, flowers and leaves few; so that the observer is first attracted to the difference by the less compact form of the Utah variety.

44. *CERCOCARPUS PARVIFOLIUS* Nutt. Near Monticello.

45. *COWANIA MEXICANA* D. Don. On rocky hills and mesas.

46. *PRUNUS DEMISSA* Walt. In deep cañons near water.

47. *PURSHIA TRIDENTATA* DC. Common on the hills and mesas, but less so than in Colorado.

48. *ÆNOTHERA PINNATIFIDA* Nutt. Thompson's Springs.

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\* EXPLANATION OF PLATE XXVI.

*CÆSALPINIA REPENS*: "A" longitudinal section of the pistil enlarged four times, showing the arrangement of the ovules; "B" the same showing the ciliate, sparingly hairy stigma; "C" stamen enlarged four times showing the peculiar hairs on the filament; "D" anther enlarged; "E" petals spread out, enlarged twice; "F" calyx spread open, enlarged twice; "G," "H" pods nearly ripe to show difference in shape; "I" end of pod enlarged to show the venation; "J" a piece of the stem near the base to show the ribs and little spines; "K" leaf enlarged showing inner and outer surface; "L" another leaf enlarged much more showing the glands and hairy surface.

49. *ÆNOTHERA CARDIOPHYLLA* Torr. Near Moab.
50. *ÆNOTHERA SCAPOIDEA* Nutt. Thompson's Springs.
51. *ÆNOTHERA TRICHOCALYX* Nutt. Thompson's Springs, and in other places along the route. The notes on the species of this genus were published in *Zoe*, vol. iii, No. 3.
52. *MENTZELIA MULTIFLORA* Gray. In bloom in the evening along the sandy bottom of Court House Wash; the flowers were all closed the next morning.
53. *ECHINOCACTUS WHIPPLEI* Eng. & Big. On the road to Monticello not far from Window Rock.
54. *OPUNTIA MISSOURIENSIS* DC. Court House Wash. This was a rare plant and a peculiar form with long, very slender white spines.
55. *CYMOPTERUS PURPUREUS* Watson. In Montezuma Cañon on a rocky hillside. At Durango it grows under the piñons.
56. *CYMOPTERUS MONTANUS* T. & G. This is the rather tall form found also at Grand Junction and Durango. On alkali deserts not uncommon.
57. *COLOPTERA NEWBERRYI* C. & R. In Court House Wash, and on a mesa after leaving Moab. It seems to approach *Cymopterus*, and the spongy wings ought not to be regarded as a generic difference since there are often both flat and spongy wings on the same fruit.
58. *GALIUM MATHEWSII* Gray. This dioecious *Galium* is widely distributed through this region and no special locality was noted. It usually grows on the sides of cañons or gulches.
59. *BRICKELLIA MICROPHYLLA* Gray. Court House Wash, along the cañon walls; a fall bloomer.
60. *BRICKELLIA LINIFOLIA* Eaton. Court House Wash, in the same locality as the above. In bloom in May.
61. *APLOPAPPUS ARMERIOIDES* Gray. Found under piñons and cedars.
62. *APLOPAPPUS SPINULOSUS* DC. This form with unusually large flowers and erect stems grows along by McElmo Creek. The species is variable.

63. *TOWNSENDIA STRIGOSA* Nutt. Common on the road to Moab and along McElmo Creek.

64. *TOWNSENDIA FENDLERI* Gray. Usually found growing on mesas through the whole region.

65. *ASTER FRONDOSUS* T. & G. Court House Wash.

65a. *ASTER TORTIFOLIUS* Gray? There are no glandular hairs or viscosity about this plant as in *A. tortifolius* and *A. Wrightii*, but it differs more essentially from *A. venustus* which it resembles in shape of leaves and manner of growth, though not so stout. It differs from *A. venustus* in the depressed hairs of the akenes which are pappus-like at the top, the ray flowers are violet with a hairy tube, akenes about half as long as in *A. venustus*, truncate instead of obovate, style branches about one-quarter as long. This with *A. Wrightii*, *tortifolius*, and *venustus* form a well-marked group, and future material and investigation may resolve them into one species.

66. *ASTER TANACETIFOLIUS* HBK. Thompson's Springs.

67. *ERIGERON BELLIDIASTRUM* Nutt. Along the road to Moab.

68. *ERIGERON UTAHENSIS* Gray. This sends up numerous branches from a woody stem. It was coming into bloom and seemed rare. Court House Wash, near the Grand River.

69. *BACCHARIS SALICINA* T. & G. On the banks of the Grand River near Moab.

70. *ENCELIA NUTANS* Eastwood. On the road between Thompson's Springs and Moab.

71. *ENCELIA FRUTESCENS* Gray. Along the walls of the cañon approaching the Grand River near Moab.

72. *BAHIA NUDICAULIS* Gray. Along McElmo Creek.

73. *CHÆNACTIS STEVIODES* Hook. & Arn. Common through the entire region. Sometimes becoming large, diffusely branching plants.

74. *TETRADYMIA SPINOSA* Hook. & Arn. Widely distributed. Thompson's Springs.

75. *SENECIO AUREUS* L. var. This variety is common under cedars and piñons in Western Colorado and Eastern Utah.

76. *CNICUS NEO-MEXICANUS* Gray. Abundant and conspicuous on hills along McElmo Creek.

77. *STEPHANOMERIA EXIGUA* Nutt. Near Moab. It opens in the early morning and closes before noon.

78. *MALACOTHRIX TORREYI* Gray. Common throughout the section.

79. *GLYPTOPLEURA MARGINATA* Eaton. Moab near the Grand River.

80. *LYGODESMIA EXIGUA* Gray. Along McElmo Creek, growing on a sandy hill.

81. *FORESTIERA NEO-MEXICANA* Gray. Growing in clumps along the San Juan River.

82. *FRAXINUS ANOMALA* Torr. Court House Wash.

83. *AMSONIA BREVIFOLIA* Gray. On the hillsides at Moab.

84. *ASCLEPIAS CRYPTOCERAS* Watson. This beautiful *Asclepias* was occasionally seen on the sides of washes. It is not common.

85. *ASCLEPIAS INVOLUCRATA* Engelm. var. *TOMENTOSA* n. var. This differs from the description of the species and from specimens in the Herbarium of the California Academy of Sciences in the following characters: Tomentose throughout, leaves ovate-lanceolate, acuminate, sometimes orbicular; margins wavy and densely tomentose from 3 to 7 cm. long and from 1 to 2 cm. broad at base. Umbel closely sessile with involucreal leaves, densely white-tomentose and linear-lanceolate. There is, however, but little or no difference in the flowers. It grew along Court House Wash and the San Juan River near McElmo Creek, and was alike in both localities.

86. *FRASERA ALBOMARGINATA* Watson. This was seen growing on a piñon covered mesa along Montezuma Creek. It also grows in the same kind of a place on Mesa Verde in southwestern Colorado. It was not yet in bloom.

87. *FRASERA PANICULATA* Torr. (?) This was not collected as the plants were not yet in bloom. It was tall, loosely and paniculately branched and the memory of its appearance agrees

with the general description of the above species. It may be *F. Utahensis* Jones.

88. *GILIA CONGESTA* Hook. The plants collected in Utah, between Hatch's Wash and Monticello, grew on a piñon covered mesa and differed in the following points from the Grand Junction form, which grew in a dry water course: The Utah form has smaller flowers with corolla tube equaling the calyx. The Grand Junction form has the corolla tube twice as long as the calyx. The ovules are less numerous in the Utah form. Both have the corolla lobes from entire to tridentate, at the apex.

89. *GILIA LONGIFLORA* Don. This was collected in Hatch's Wash with the tube of the corolla more than inch long.

90. *GILIA PUNGENS* Benth. This is the large white-flowered form with very small leaves in interrupted fascicles. In Montezuma Cañon.

91. *GILIA INCONSPICUA* Dougl. Near Moab and along McElmo Creek.

92. *GILIA LEPTOMERIA* Gray. Collected at Moab. This seems very near to *G. inconspicua*.

93. *GILIA GUNNISONI* T. & G. Common in Court House Wash.

94. *GILIA TRIODON* n. sp. Annual, from ten to twenty cm. high, branching diffusely upwards from the base with numerous slender branches, stipitate glandular throughout except the parts of the flower within the calyx, leaves clustered at the root, thickish, runcinate pinnatifid into nine or ten divisions, which are either entire or dentate, the teeth often tipped with short bristles; stem leaves bract-like, diminishing upwards; small flowers numerous scattered along and terminating the branchlets; calyx campanulate, two to three mm. long, cleft half way down with five or sometimes six green tipped bristle-pointed lobes, the membranous lower part folding in like a fan; corolla minute, salver-form, the tube exserted, tapering from a broad base to the throat, divisions tridentate, with middle tooth longest, and the sinuses rounding, minutely tuberculate; stamens with slender filaments and cordate acuminate anthers; pistil with the stigma

club-shaped, obscurely tridentate; ovules numerous; capsule slightly surpassing the calyx, seeds tuberculate developing spiracles and mucilage. In habit this seems to belong to *Eugelia*; but it differs from all described *Gilias* in having no style branches, but instead a club-shaped tridentate stigma. Collected June 20, 1892, in Ruin Cañon, a branch of the McElmo and near the boundary line between Colorado and Utah. It was named from the appearance of the stigma and petals.

95. *GILIA SUPERBA* n. sp. Stems one or several from a woody tap root, each with a rosulate cluster of leaves at base, cymosely branched above, or even diffuse from near the base; glutinous throughout; radical leaves varying from spatulate and entire to obovate-cuneate, with margins crenately to incisely dentate, with apiculate teeth, tapering into margined petioles, which are often purplish on the mid-nerves and at the base; 3 to 5 cm. long; cauline leaves few and scattered, sessile, incisely dentate, small, and decreasing upwards into linear-subulate bracts; flowers clustered at the ends of the long, almost naked peduncles, on pedicels equalling or shorter than the calyx; calyx open campanulate, the five triangular-acute lobes about equalling the tube, purplish, dotted with stipitate glands; corolla crimson, velvety in texture, salver-form; tube about three times as long as the calyx, widening upwards, lobes obovate, shorter than the tube, about 5 mm. broad; stamens equally inserted and wholly included; style as long as the corolla tube, surpassing the stamens; ovules numerous (about fifty); immature seeds irregular in shape, with a loose, crumpled outer coat, fewer than the ovules. (Plate XXVII.)

This beautiful and showy *Gilia* belongs to the section *Ipomopsis*, and comes nearest to *G. Haydeni*, with which it has been directly compared, not only with specimens from the type locality, but also with the type itself, in Mr. Brandegee's Herbarium. This is either a winter annual or a biennial, while *G. Haydeni* is perennial, the cauline leaves are more bract-like and fewer, it is less diffuse but taller, larger, and much more glutinous, the calyx is more spreading and with the lobes not membranously margined; the stamens of *G. Haydeni* are protruded beyond the tube, and the stigma is below them; in *G. superba*

the opposite is the case; the ovules are much more numerous in this species, and shaped differently.

The plants were collected at Hatch's Wash, in southeastern Utah, between Moab and Monticello, on May 29, 1892. They were abundant in a limited area, on sandy knolls formed by the accumulated sand that had been washed down from the basin-like sides of the shallow cañon, and were not met with at any other place.

96. *PHLOX NANA*. Growing at the base of a cliff between Hatch's Wash and Monticello.

97. *PHACELIA NUDICAULIS* n. sp. Annual, low, and almost prostrate, stems several (4-7) from the root, naked to the inflorescence, nodes 1-2 cm. long, internodes shorter; glandular and hirsute, with short, white bristles; leaves thick, orbicular, or broadly ovate, abruptly tapering to the petiole, blade about 1 cm. long by not quite so broad, petiole equalling or surpassing it in length, margins slightly undulate and revolute; radical leaves few; cauline, crowded at the ends of the branches, surrounding and almost hiding the flowers, which are solitary in the forks of the branches or in few flowered spikes which are cymosely arranged; sepals linear-spatulate, united at base, spreading, and surpassing the capsule; corolla 3 to 5 mm. long, surpassing the immature calyx, violet, tubular funnel-form, with rounding lobes acute or obtuse, hairy on the outside but smooth within, the folds at the base linear and attached to the stamens; filaments smooth, equally inserted, but of unequal lengths; style cleft half-way down, with capitate stigmas, hairy to the forks; capsule blunt, hairy; seeds about 16, oblong, pitted, variable in thickness, from flat to lens-shaped, probably modified by the pressure from each other in the crowded cells.

This desert *Phacelia* was collected on the road from Thompson's Springs to Moab, May 24, 1892. It grew on a flat, adobe desert with *Cleomella plocasperma* (?), and was abundant over a very limited area. It most nearly approaches *P. cephalotes* Gray, from which, however, it is quite distinct.

98. *PHACELIA CEPHALOTES* Gray. This presents some very interesting variations in the style branches. In some flowers it



is undivided and capitate, in others with two distinct capitate stigmas, while in others the styles are distinct for about 1 or 2 mm. The calyx and corolla often have six divisions; the seeds are honeycombed. Collected on a sandy flat in Montezuma Cañon, June 1, 1892.

99. *PHACELIA CRENULATA* Torr. Moab. This is very common also at Grand Junction on the mesas.

100. *CONANTHUS* ———. Collected at Thompson's Springs May 23, 1892. This is similar to the plant distributed by Wm. C. Cusick and named by Dr. Gray *C. parviflorus*; but it was never published.

101. *COLDENIA HISPIDISSIMA* Gray. On the hills around Moab and in Court House Wash.

102. *KRYNITZKIA LEUCOPHÆA* Gray. Common on mesas through the whole region.

103. *KRYNITZKIA PTEROCARYA* Gray. Near Moab.

104. *KRYNITZKIA* ———. Court House Wash. This is left undescribed and undetermined until time can be given to a most interesting collection of this genus.

105. *DATURA METELOIDES* DC. Common in the dry bed of McElmo Creek and along the banks.

106. *LYCIUM PALLIDUM* Miers. Montezuma Cañon near the San Juan River and McElmo Cañon. This prevailed in occasional tracts.

107. *NICOTIANA ATTENUATA* Torr. Ruin Cañon. Widely distributed.

108. *CHAMÆSARACHA CORONOPUS* Gray. Montezuma Cañon and where the McElmo joins the San Juan. The star-like flowers open towards evening.

109. *PENSTEMON EATONI* Gray. Court House Wash and other cañons on the road. This is one of the most showy penstemons and worthy of cultivation.

110. *PENSTEMON UTAHENSIS* n. sp. Stem erect, one or several from the root, one to two feet tall, glaucous and glabrous throughout; radical leaves from spatulate, about two cm. wide,

to oblanceolate, five to eight cm. long by one cm. wide; slightly wavy; stem leaves far apart, about eight cm. between the lowest pairs, less above, oblong, sessile by a clasping base, diminishing upwards; flowers in an interrupted loosely and few flowered thyrse; calyx small, divisions abruptly pointed and thicker at the apex; corolla funnel form, two cm. long, lobes large, orbicular and spreading, three to five mm. broad, carmine; two stamens inserted at the base of the corolla; the others even with the sterile filament which is hooked at the glabrous end; style broadening to the paddle-shaped stigma and to the pointed ovary.

Were it not for the tip of the sterile filament this would unhesitatingly be placed with *P. Parryi*, but if that distinction is worth anything it must belong to the next group near *P. grandiflorus* which it is as unlike in all the other characteristics whereby it resembles *P. Parryi*. It is a beautiful and showy plant. The very glaucous foliage softens the bright carmine flowers which are velvety in texture and of beautiful shape with the round evenly spreading lobes of the funnel form corolla. It was collected between Hatch's Wash and Monticello, May 28, 1892; also on the San Juan River near where McElmo Creek enters.

111. *APHYLLON MULTIFLORUM* Gray. Along McElmo Creek, June, 1892.

112. *POLIOMINTHA INCANA* Gray. This was collected in Court House Wash on the Sandy Flat near the Grand River. It has a large prostrate woody stem and usually forms a knoll, from the sand collecting around its firm base. The numerous branches are slender and erect; the foliage is silvery canescent and the flowers a lovely blue. It has a sweet perfume.

113. *HEDROMA DRUMMONDII*. In a branch of McElmo Cañon.

114. *ABRONIA TURBINATA* Torr. Thompson's Springs.

115. *ABRONIA MICRANTHA* Torr. Thompson's Springs and on the road to Moab.

116. *ABRONIA CYCLOPTERA* Gray. In the same localities as the two above; but more abundant than either.

117. *ATRIPLEX ARGENTEA* Nutt. Along the San Juan River and elsewhere.

118. *ATRIPLEX NUTTALLII* Watson(?). This differs somewhat from the species and may be new. The material is hardly sufficient for satisfactory determination.

119. *GRAYIA BRANDEGEI* Gray. Blooming plants were collected on a hill near McElmo Creek. They were not far enough advanced for good specimens but could be distinguished from the *Atriplex* which they resemble.

120. *GRAYIA POLYGALOIDES* Hook. and Arn. Common at Thompson's Springs. A form with very large fruit was found near McElmo Creek.

121. *SARCOBATUS VERMICULATUS* Torr. Widely distributed along streams. Montezuma Creek.

122. *ERIOGONUM THOMASII* Torr. Court House Wash, near Moab, growing along the rocky cañon walls.

123. *ERIOGONUM INFLATUM* Torr. Common on the desert plains and the cañon sides. It is called trumpet-weed at Moab. The inflation is almost globular in the plants of the plains, but long and narrower on the hill-side forms, which also grow much taller than the others. The inflated portion is empty, not containing a drop of moisture. Growing with the inflated plants are many smaller plants destitute of the swelling.

124. *ERIOGONUM GLANDULOSUM* Nutt. Montezuma Creek.

125. *ERIOGONUM DIVARICATUM* Nutt. Montezuma Creek.

126. *ERIOGONUM SALSUGINOSUM* Nutt. Montezuma Creek.

127. *RUMEX VENOSUS* Pursh. Near the spring on the road to Moab.

128. *EUPHORBIA FLAGELLIFORMIS* Engelm. Young plants of this were coming up, the old ones were near by, the dry stems containing fruit, so the species could be determined from all the material. Near the Grand River, in Court House Wash, and on the San Juan flats.

129. *CELTIS OCCIDENTALIS* L. Along McElmo Creek and in the branch cañons.

130. *QUERCUS UNDULATA* Torr. There were two distinct forms or two species. One had deciduous leaves, the other evergreen. They grew together in Hatch's Wash.

131. *SALIX* ———. This was not collected, for it was out of flower and fruit.

132. *POPULUS AUGUSTIFOLIA* James. Montezuma Cañon.

133. *ALLIUM NEVADENSE* Watson (?). This was collected on a mesa between Cane's Spring and Hatch's Wash. It also grows at Grand Junction, and is distinguished chiefly by an offshoot from the veiny-coated bulb.

134. *CALOCHORTUS NUTTALLII* Torr. & Gray. Montezuma Cañon.

135. *CALOCHORTUS FLEXUOSUS* Watson. Along McElmo Creek.

136. *HESPERANTHES ALBOMARGINATA* Jones. On the road to Moab in a desert flat.

137. *BLEPHARIDACHNE KINGII* (Watson) Hack. This is *Eremochloe Kingii* Watson of King's Report.

138. *STIPA PENNATA* L. var. *NEO-MEXICANA* Thurb. On the mesas near McElmo Creek.

139. *EPHEDRA TRIFURCA* Torr. In a cañon between Hatch's Wash and Monticello. Collected in good fruit.

140. *JUNIPERUS OCCIDENTALIS* Hook var. *MONOSPERMA* Eng. The common Juniper or cedar of the mesas.

141. *PINUS EDULIS* Eng. The piñon or nut pine, found usually with the Juniper named above.

These were all noted or collected on the trip from Thompson's Springs to McElmo creek at the Utah line. Many extended also into Colorado; for state lines make no difference in the flora. However, as the list is headed "Utah Plants," it is best to stop at the boundary line. The route was from Thompson's Springs to Moab, from there by way of Hatch's Wash to Monticello, then down Montezuma Cañon to the San Juan River, and thence up the McElmo. The time was between May 24 and June 3, 1892. The general description of the country was given in Zoe iii, 4.

## DESCRIPTION OF A LUMINOUS LARVA FOUND NEAR HOLBROOK, ARIZONA.

BY C. H. TYLER TOWNSEND.

On the night of June 27, 1892, while camped about five miles west of Holbrook, Arizona, I found a luminous larva running over the ground. The prothoracic segment was especially and continuously luminous, while the other segments, especially the more terminal ones, were all more or less so. Each segment was luminous for a certain space about the centre of its dorsum, and thus taken together they looked like a string of beads in the dark, the prothorax, however, being wholly luminous.

The larva is coleopterous. It does not much resemble an elaterid larva, while it is equally unlike a lampyrid. It differs in its shape, and also very markedly in its characters, from the supposed larva of *melanactes* figured by Riley and described by Bethune and Osten Sacken.\* It further differs very strikingly by the luminosity not being located in the same regions of the larva as those indicated in the figure above referred to. Instead of being at the side of each segment, and at the incisures, the centre of the segments is luminous, according to my notes. These notes on the luminosity of the larva were made in the field at the time, and the details have since escaped my memory. But I do not think that I mistook the incisures for the segments.

*Description of larva.* Length, hardly 12 mm.; greatest width (segs. 9-10),  $1\frac{3}{4}$  mm. Whitish in color originally; changed by immersion in alcohol to a pale rufous above and pale flavous below. Elongate, of nearly equal width, but slightly narrowed anteriorly, and posteriorly flattened. Consisting of thirteen segments, rather chitinous on whole surface, especially on dorsum, head, and ventral thoracic portion. Head retracted within the prothoracic segment, the third to twelfth segments each retracted for about its anterior one-third within the next segment anterior to it. Second or prothoracic segment elongate, longer than any of the other segments, gradually narrowed

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\* Riley, Amer. Ent., iii, 202; and LeBaron, 4th rep., 99.—Bethune, Can. Ent., i, 2.—Osten Sacken and Bethune, Can. Ent., i, 38-9.—Osten Sacken, Proc. Ent. Soc. Phil., 1862, 125, pl. 1, f. 8; and iv, No. 2, 8.

anteriorly where it is but little wider than the head. Segments three to eight equal in length, each hardly two-thirds length of second, very gradually widening to eighth, which is but little wider than three; segments nine to twelve a little longer, hardly wider than others; thirteen a little longer than twelve, not as long as second, a little narrowed and rounded off behind, with a segment-like anal joint or appendage which shows very plainly on the ventral surface, making the larva appear fourteen-jointed, and is doubtless homologous with the so-called anal proleg, though it does not appear to possess this function in the present case. All the joints except head covered dorsally with fine short posteriorly directed bristly hairs, longer and directed more outwardly on sides, extending down on lateral ventral surface; median ventral surface less distinctly short hairy except on thoracic segments. Head bears some bristly very short hairs on edges. A moderately large black convex simple eye on outer anterior edge of head, rather prominent, partially hidden by the head being retracted within the overlapping anterior dorsum of prothorax. Antennæ short, situated just anterior to and inside of eyes; basal joint stout and rather tubercular, second joint smaller, about as wide at base as long, subconical, bearing some bristly hairs; third joint minute, as long as broad, terminated by a few short hairs. Mandibles apparently single-toothed, blackish, curved, and rather claw-like, not stout. Maxillæ two-jointed, stout, the joints rather cylindrical; second joint as long as wide, but narrower than the basal. Maxillary palpi small, apparently two-jointed, the second joint but little smaller than the basal. Labial palpi very small, slender, two-jointed, the joints short and subequal; an anterior prolongation of the labium between them surmounted by two fine hairs. Prothoracic segment deeply notched anteriorly below with a V-like fold of the integument extending not quite to its posterior margin, exposing what seems to be a separate sclerite belonging to the prothoracic segment. Spiracles situated about middle of lateral edges of segments five to twelve inclusive, but appearing anterior to middle when the segment is retracted. Legs apparently four-jointed, basal joint elongate, appearing as a prolongation of the integument; second joint short, about one-half

as long as basal joint, third and fourth joints about equal in length, twice as long as second, the fourth tapering to its extremity, which is terminated by a slightly curved, rather elongate chitinous claw or hook. The last three joints of the legs are furnished with a sparse fringe of small bristly spines on inside.

Described from one specimen. Arizona.

A luminous larva was reported to me, in the spring of 1892, as numerous in the Mimbres country, in Grant County, New Mexico. No specimens, however, were obtained.

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#### NOTES ON THE FLORA OF GUADALUPE ISLAND.

BY F. FRANCESCHI.

The Island of Guadalupe has been botanically explored first in 1875 by Dr. Edward Palmer, and second by Prof. E. L. Greene in 1886, Dr. Palmer having made a short visit there and collected again in 1889. For a newcomer there was in consequence but little hope to find anything that had escaped such experienced and diligent observers; the more so as it was well known that the work of extermination of that most interesting flora, due to the wonderful increasing of wild goats there, had gone on unabated these last ten or twelve years. My purpose in visiting the island, rather than the hope of adding to the number of the plants registered already by Dr. Palmer and Prof. Greene as belonging to Guadalupe, was to gather more information on the present state of vegetation on the island, and full particulars on the appearance, the habit, the flowering, and fruiting of many of the trees and shrubs peculiar to Guadalupe, of which a few have been sparingly introduced in gardens, and others well deserve to be. For detailed accounts on the palm, the cypress, the pine, and the oak of Guadalupe, as well as on the most noteworthy shrubs, I must refer to papers sent to "Garden and Forest," of New York, and to the "Gardener's Chronicle," in London. A few remarks of a more general character will, I hope, be found of interest as preceding the list of plants I was able to collect there during December and part of January last.

The Island of Guadalupe, situated between 29 degrees latitude north, and about 150 miles west of the coast of Lower California, measures nearly nineteen miles in length from north to south, by six to seven in breadth. The highest peak, Mount Augusta, reaches 4,500 feet, but is hardly to be noticed as it stands near the centre of the island, only a few hundred feet higher than the surrounding plateau. Guadalupe is not exactly a table-land, as it has been described, but rather a succession of several plateaus at different altitudes, of ridges, of old craters, and of powerful lava dykes appearing to have sprung out from various points and flown in every direction. The volcanic action which formed the island—now entirely subsided, there being no trace of thermal waters nor of gaseous emanations of any description—must have been grand and powerful indeed, if one considers the remains of the circus of the primitive crater in the north part of the island, rising to more than 3000 feet above the sea level and fully four miles in diameter. Two-thirds of this circus still exists, the eastern part of it having been swallowed by the ocean in some later convulsion, and at the southern part, towards the centre of the island, this high ridge blends with the plateau where Mount Augusta rises, this last offering no trace of eruptive crater, but of having given birth to immense currents of lava, most of them now covered with cypresses.

The standing portions of the circus emerging from the sea on the north and northwestern side of the island are exceedingly steep and precipitous, cut by a few deep cañons, and with some adventitious and comparatively small cones of eruption. Just on the slope of one of them is to be seen the principal grove of palms (*Erythea edulis*) with a few intermingled fine specimens of oaks and many more pines, the latter extending all over the northern part of the island, which in times past they must have covered with a very thick forest. The immense crater was once filled up to the height of 2000 to 2500 feet, and a section of this plateau remains still unaltered in the shape of a crescent, its surface rising gently from north to south. Here are to be found the sole appreciable springs of water, evidently nourished by the fogs that at all seasons are very often brought by the predominating northwest winds against the high overstanding ridge and



there deposited. The few scattered pines still living on the ridge afford a fine example of the power of trees in condensing and storing water. When a strong wind blows the fog up from the ocean, while the surrounding ground looks hardly wet, under the pines it will be pouring hard with streamlets of water running from the base of their trunks. For this peculiar office the acicular leaves of the pines are eminently adapted, and one can easily understand that when all the northwestern part of the island was clothed with a dense pine forest, springs must have been much more abundant, and the vegetation on the eastern side must have largely benefited by them. The springs are not far from each other and nearly in the centre of them are the cabins built a few years ago by the International Company of Lower California, which has since abandoned the lease of the island as unprofitable.

The increase in the number of wild goats has gone on these last years unchecked by the few thousand which may have been killed by the poachers who visit the island from time to time. The result is vividly shown by the fact that in all my ramblings over the island I was unable to find but one single shrub, *Ceanothus crassifolius*, alive in any of the places inaccessible to goats. Endowed as these are with proverbial climbing ability, the more so when pressed by hunger, the few plants that have escaped destruction are those growing on the perpendicular basaltic cliffs, accessible only to winged creatures, and old trees with bark too hard and woody to offer any food. Most of the shrubs and perennials seem not to be much adapted to assume a "rupicole" habitus, seedlings being exceedingly scarce, so that in a few years' time many of the species, represented now by a very limited number of individuals, will be entirely lost. The same fate, in a longer period, is likely to be shared by the trees of which at present only the cypresses and palms are growing in large numbers, no reproduction being possible, as all seeds falling to the ground are devoured by goats or by mice. It is wonderful to see how kids a few months old, far from starving, are able to break and chew the kernels of the palm, hard as marble as they are. Anyone who has traveled along the Mediterranean basin, especially in some parts of Turkey and

Greece, must have acquired a fair idea of the destructive power of goats; but what is to be seen in Guadalupe far surpasses any anticipation.

It would appear at first that annuals, unprovided by nature with a perennial or woody axis, ought to have been the first to disappear; but just the contrary has happened, probably owing to the circumstance that the cycle of evolution of an annual plant (more so in such a dry region) is exceedingly short, and coincides with the period of most plentiful production, so that there is much more chance of the ripening of an abundant crop of seed which, by its minuteness and unattractiveness, escapes destruction and assures a large reproduction of the species. Shrubs and perennials are exposed all the year round to the destructive teeth of the goats, and it is a well-known fact that no matter how hard and enduring the vitality of such plants, in the long run they are unable to survive the constant clipping of their aerial parts.

Among the plants collected by myself in Guadalupe, annuals could not be numerous, owing to the season of the year, and very little was added to the island record. I was able, however, to secure a small plant of what appears to be a *Heuchera*, probably the unidentified species collected, in 1875 only, by Dr. Palmer, and a plant also of a *Cotyledon*—no species being described from the island. Among cryptogamous plants *Parmelia physodes* L. var. *enteromorpha* Tuck., *Usnea barbata* L., *Ramalina homalea* Ach. are not to be found in the already published lists; all of them are known, however, on the mainland of California.

The figures following the species are the serial numbers of the collection.

*Crossosoma Californicum* Nutt. Only one specimen found with few flowers; in bloom about the middle of December. Growing on the almost inaccessible cliff of the lower circus east of the cabins. (42.)

*Eschscholtzia Californica* Cham. Plentiful in the same limited locality pointed out by Prof. Greene; positively perennial; its leaves clipped pretty closely by goats. (19.)

*Eschscholtzia elegans* var. *ramosa* Greene. Rather plentiful not only along the beach north of the landing, as noticed by

Prof. Greene, but also in the dry bed of the cañon and on the bare dry rock at the mouth of it, and a single specimen found on the ridge of the lower crater about the centre of the island east of Mt. Augusta. All these plants appear to be annual, but apparently the same species grows luxuriantly as a perennial on a nearly inaccessible cliff of lava detritus on the right bank of the cañon 500 or 600 feet from the landing. These plants were already in flower at the beginning of January. The flowers have no greenish tinge at all; petals not over two-thirds of an inch long. (20.)

*Oligomeris subulata* Boiss. Cañon near the landing. (64.)

*Lepigonum macrothecum* F. & M. Seen only on a perpendicular cliff on the right bank of the cañon, not far from the landing; growing there in number. Specimens of a *Silene*—dried stocks of the preceding year were abundant near the landing. (29.)

*Claytonia perfoliata* Donn. Quite common from centre to north, most luxuriant under the palms where it was in flower early in December. (53.)

*Lavatera occidentalis* Wats. A few scattered specimens, all on the most inaccessible rocks east of the island. A few seedlings not likely to survive found in several localities. (12.)

*Malva borealis* Wallm. Now a common weed; apparently not liked by the goats. (54.)

*Sphæralcea sulphurea* Wats. Much more abundant than *Lavatera*, one of the very few plants of which some meager specimens may be seen scattered about even in places occasionally visited by goats. Seedlings and young plants observed near the landing both on the beach and on the dry lava rock. (13.)

*Erodium moschatum* L'Her. Plentiful all over, chiefly among rocks and stones; not so much so, however, as *Erodium cicutarium* which now literally covers the whole surface of the island. *E. moschatum* appears not to be liked by goats, at least where other food is obtainable. (22.)

*Ceanothus crassifolius* Torr. Twelve to fifteen feet high. Only one plant found alive near the centre of the island west of Mount Augusta, among the cypresses, but surrounded by what appear

to be the dead stumps of thousands of its brethren, which must have formed a thick and general underwood not only in the larger cypress grove, but also in the smaller near the springs and cabins. Later three or four more living plants were found in the upper grove. (6.)

*Rhus laurina* Nutt. Probably the same four plants seen by Dr. Palmer, growing not far apart on the basaltic cliff east of the cabins. Another specimen too high up to be surely identified was seen on the right bank of the cañon near the landing. (9.)

*Lupinus niveus* Wats. Apparently annual, a few seedlings found in different localities, but chiefly on the flat ground next to the large spring south of the cabins. (23.)

*Trifolium amplexans* T. & G. Seen only in the cañon near the landing, but not in large numbers. (26.)

*Trifolium Palmeri* Wats. In the same locality, but much more abundant. (27.)

*Hosackia argophylla* Gray. Very few seedlings, observed only on the beach north of the landing. (24.)

*Heuchera* ———. Single specimen not in flower.

*Cotyledon* ———. Only one small plant on a rock along the trail not far from the landing.

*Echinocystis Guadalupeensis* Naud. Seen only among rocks on the right bank of the cañon not far from the landing, but I was assured that it grows all over the island. Young shoots appeared about the middle of January. (47.)

*Opuntia prolifera* Engelm. Observed but not collected.

*Galium* ———. Two species; plentiful in many places, but chiefly under the palms. Not collected.

*Filago Californica* Nutt. Very plentiful. (25.)

*Diplostephium canum* Gray. Only one plant seen, in such an inaccessible position on the cliff of the lower circus near the corral, that it was impossible to secure more than a few scanty specimens. (41.)

*Eriophyllum* ———. Woody, perennial, on a rock near the cabins. (61.)

*Perityle Californica* Benth. Quite plentiful near the landing along the beach in the bed and on the banks of the cañon; in flower beginning of January. Not seen anywhere else. (46.)

*Perityle incana* Gray. By far the most abundant of all the shrubs still living on the island and the most likely to survive under the unfavorable circumstances, as it seems quite at home on the more precipitous cliffs, and young plants and seedlings are abundant in the crevices of the rocks. A few straggling flowers appeared as early as the middle of December. (7.)

*Matricaria discoidea* DC. Plentiful near the springs, on wet ground, which it covers with a dense and tufted carpet; larger specimens were collected at the spring west of the cabins, where they were already blooming at Christmas. (30.)

*Artemisia Californica* Less. Basaltic cliff east of the cabins in considerable number, also a mile or so to the north. (11.)

*Senecio Palmeri* Gray. Very conspicuous and much whiter even than *Perityle incana*; perhaps three dozen specimens seen on the eastern cliff above mentioned. (10.)

*Microseris linearifolia* ? Gray. (56.)

*Sonchus oleraceus* L. Very common in the bed and on the banks of the cañon near the landing.

*Dodecatheon Meadia* L. Robust, large-leaved specimens. Most abundant only between the trail to the cabins and the cliff; the finest on the very ridge. Goat-hunters, short of tobacco and attracted by the leaves, have used them as a substitute. They are said to have a most pleasant flavor. (31.)

*Gilia Nevinii* Gray. Cañon near the landing and very common among rocks over the whole island. Not liked by the goats. (57, 59.)

*Nemophila racemosa* Nutt. Already in flower early in December on the northwestern part, under the palms. It grows plentifully among rocks all over the island. The goats appear not to like it. (32.)

*Ellisia chrysanthemifolia* Nutt. (56 bis.)

*Phacelia phyllomanica* Gray. A most elegant shrub with finely cut foliage, dark green above and whitish below; a con-

siderable number of plants in a limited locality on the cliff east of the corral. (43.)

*Emmenanthe penduliflora* Benth. Cañon near the landing. (58.)

*Krynitzkia maritima* Greene. Seen only near the mouth of the cañon, near the landing; beginning to flower in January. (33.)

*Krynitzkia foliolosa* Greene. Cañon near the landing. (55.)

*Convolvulus macrostegius* Greene. Highly relished by goats, but still keeping its hold on the most perpendicular cliffs where its drooping deep green masses form a striking contrast to the silvery foliage of *Perityle Palmeri*. No seed could be found and I was only able to obtain a few seedlings. (8.)

*Solanum Xanti* var. *Wallacei* Gray. On the eastern cliff a little south of the corral. A fine shrub worthy of cultivation, already in flower at the beginning of January, the rather large deep blue—not at all pale—flowers showing well on the deep green foliage. (15.)

*Solanum nigrum* Dunal. Not so rare as when Prof. Greene visited the island. A few found in crevices of the lower circus, more in the cañon near the landing; perennial but very herbaceous; flowers from white to lilac, quite minute and well distinct from the next. (16, 18.)

*Solanum Douglasii* Dunal. Perennial, with conspicuous star-shaped, pure white flowers, forming handsome bushes. Three plants found—two on the dike of lava on the southern side of the landing, and one a little way up the cañon. On account of its seeding freely even in winter it is quite likely that many more plants grow on the adjoining almost inaccessible slope overhanging the sea. (17.)

*Mirabilis levis* Benth. Only near the landing but there quite plentiful, not only along the beach but also on the precipitous slope overhanging the sea, at the south of it, forming mats of pink flowers already at the beginning of January. (45.)

*Chenopodium murale* L. Rather common only near the landing. (63.)

*Hesperocnide tenella* Torr. Very common everywhere. (60.)

*Quercus tomentella* Engelm. In the northwestern part of the island with the palms. The trees are fine specimens forty to sixty feet high, remarkable for the grayish color of the bark and the size of the leaves, which are glossy dark green on the upper surface and covered with a somewhat rusty tomentum beneath. (4, 5.)

At the eastern part, right under the cliff of the inner circus grow some trees in two different localities more than a mile apart, which if not specifically distinct appear at least to be a very different form, not only by the leaves, but also by the bark which is darker and corky. These trees are rather stunted and branching from the base. No acorns or cupulæ were to be found. A few scattered oaks were also observed near the north end, and it is the only tree to be seen at the southern part. They appear not to grow above 1800 or 2000 feet elevation.

*Erythea edulis* Wats. Northwestern part of the island, the principal grove not less than one mile and a half long by half to one mile in breadth. There, and in the few other parts where palms are still growing in small numbers their range in altitude appears to be between three hundred and a thousand feet. A few expanded flowers were to be found already at the beginning of December, but the general blossoming takes place in January and the fruits are said to ripen in April. (1.)

*Muhlenbergia debilis* Trin. Only near the landing, on the beach as well as the banks and bed of the cañon. (34.)

*Polypogon monspeliensis* Desf. Plentiful only on saline soil around the springs near the corral; goats and donkeys appear to dislike it. (35)

*Cupressus Guadalupeensis* Wats. Centre of the island and around the springs; very variable in habit, in color, as also in the size and shape of the cones. The principal grove on the higher central plateau covers an area of not less than two or three square miles. (3.)

*Pinus insignis* var. *binata* Engelm. Only on the northern and northwestern part of the island, the finest trees growing amongst the palms. On some of the trees both the abnormal

two leaves and the normal three were to be seen on the same branch. (2).

*Polypodium Californicum* Kaulf. Rather scarce, always in shady or sheltered localities. (36.)

*Gymnogramme triangularis* Kaulf. The most widely spread fern, growing luxuriantly in the crevices of rocks with northern exposure, also in very dry sunny spots, but then much reduced in size. (38.)

*Notholæna Newberryi* Eaton. Nearly as common as the preceding and always in places fully exposed to the sun. A form is occasionally found associated with the first, but of a more slender habit and much more finely dissected leaves. (39.)

*Pellæa ornithopus* Hook. The more scarce fern on the island, seen only at the eastern side on basaltic rocks fully exposed to the sun. (37.)

*Parmelia physodes* L. var. *enteromorpha* Tuck. Exclusively on dead branches of cypresses. (48.)

*Usnea barbata* L. Growing on the living trunks of the palms, only on side facing the sea. (49.)

*Ramalina homalea* Ach. On rocks facing the sea among the palm grove, on the western side. (50.)

*Physcia* sp. ? Shady places in various parts of the island. (52.)

For the identification of the above mentioned species I am indebted to Mrs. Katharine Brandegee; for the lichens to Prof. E. L. Greene.

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#### NOTE ON TERMOPSIS ANGUSTICOLLIS HAGEN.

BY C. H. TYLER TOWNSEND.

On February 11th, some large termites were brought to me, which had been found in galleries in dead or nearly dead cottonwood trees (*Populus Fremontii*), near Las Cruces, New Mexico. They consisted of soldiers, workers, and immature sexual individuals showing short wings.

Some specimens were sent to Dr. C. V. Riley, who wrote as follows: "The termite which you send seems to be identical



with the species which was determined for me some time ago by Dr. Hagen as *Termopsis angusticollis*. The specimens which I had received previously had come from California only, although I had received them from San Bernardino, Los Angeles, and Placer Counties."

The following are the measurements of the specimens, including another lot received about a week later:

*Soldier*: From tips of mandibles to extremity of abdomen is 20 mm.; mandibles are 5 mm. long; body, from base of jaws, 16 mm.; body, excluding head,  $11\frac{1}{2}$  mm.; head is a little more than 5 mm. wide.

*Worker*: 13 mm. long; head,  $3\frac{1}{2}$  to  $3\frac{2}{3}$  mm. wide.

*Immature sexual individual*: 13 mm. long; head, 3 mm. wide.

The workers and sexual individuals are pale straw color; the soldiers are same color, except that the head is more fulvous, becoming darker anteriorly, and the jaws are black. Smaller individuals than the above were also found. There were no fully winged individuals at this season.

This species is probably *Termopsis angusticollis*, which, with *Termopsis occidentis*, are the largest species of the family mentioned in Dr. Hagen's synopsis of the Neuroptera of No. Amer. (p. 3). The soldier described by Hagen under name *Termopsis occidentis* is not this species, as suggested by Hagen (l. c.). The soldier of the present species does not have the prothorax anteriorly emarginate, but nearly straight instead, and the meso- and meta-thoracic posterior angles are not specially produced.

*Termopsis occidentis* Wlk. (soldier, body 14 mm.) is described from the west coast of Central America. Dr. Hagen saw the type. *Termopsis angusticollis* Hagen (sexual individual, body 11 mm.) is described from Louisiana, California, and Puget Sound.

These termites are said to make longitudinal galleries in the cottonwood trunks, more or less parallel, running irregularly up and down, a couple of inches or so apart, and being about that much in diameter. A section of a stick containing galleries was brought me, from which I have taken the following measurements:

The stick contains some irregular galleries measuring from  $2\frac{3}{4}$  to  $3\frac{1}{2}$  cm., approximately, in diameter, in some places more or less honeycombed, while they widen out in others into a sort of a chamber more or less irregular in shape, the one chamber in the stick being in the region of a knot which has been hollowed out. Small side galleries occur, one measuring 13 by 6 mm.; another, smaller, is 10 by 5 mm.; while a third is 8 by 20 mm. These galleries mostly run with the grain. The side of the largest gallery is 7 cm. in width, the other side being detached. Opposite the chamber this gallery widens to  $7\frac{1}{2}$  cm. The portion of the chamber contained in the stick is  $7\frac{1}{2}$  cm. one way, by from  $1\frac{1}{2}$  to 3 cm. the other. Another gallery is 6 by  $2\frac{1}{2}$  cm.; another, 6 by  $1\frac{1}{2}$  cm. The galleries are more or less lined with the frass from the termites. Then there are pockets: One,  $2\frac{1}{2}$  by  $1\frac{1}{2}$  cm. in diameter, and 5 cm. deep; another,  $2\frac{1}{2}$  by  $1\frac{1}{4}$  cm., and  $3\frac{1}{2}$  cm. deep. Other pockets are smaller.

It is asserted by the foreman on the place from which these termites came, that they are frequently found in the live wood. A row of large cottonwoods along an acequia showed an unhealthy condition, and was cut down. Most of these were found to be mined by the termites. They seemed to prefer the more moist parts of the trees, either live wood or wood moistened by the proximity of the water in the acequia.

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## NATIVE HABITS OF SEQUOIA GIGANTEA.

BY GUSTAV EISEN.

One of the most beautiful of all trees, as well as one of the very largest, is our well-known *Sequoia gigantea*, or the California Big Tree. No tree known is so well adapted to be a "memorial" tree as this giant of the California Sierra Nevada, not alone on account of its size, which reaches 350 feet in height by 45 feet in diameter, nor by its beautiful and symmetrical form, in which it is not surpassed by any other coniferous tree, not even the famous cedars of Lebanon, Himalaya, and Atlas. But the chief advantage of the Sequoia for memorial planting is

its rapid growth coupled with its longevity. The largest trees in the Sierra must have reached an age of between 4000 to 5000 years. When the Cheops pyramid in Egypt was being constructed our largest Sequoias now standing were already youngsters of respectable size, and when Cæsar conquered Gaul the very trees we now gaze on were already older than almost any other tree now extant.

If we add to its other good qualities those of its ability to stand a very low temperature as well as a very high one, it may be seen that its advantages are indeed many, and that a better tree for memorial planting can hardly be had. But the nature of the *Sequoia gigantea* is little understood, and to this want of knowledge of its nature and the conditions under which it thrives must be laid the many reported failures in growing this tree, failures which are both frequent, alarming, and discouraging. Not one gardener in a million has ever seen the *Sequoia gigantea* in its native home in the Sierra Nevada, and few of those who have seen it have realized the peculiar conditions under which the tree thrives. That our Sequoia is a declining species can now be little doubted, notwithstanding the efforts and statements of several enthusiasts to the contrary. The Sequoia is a relic of the past, at least as far as California is concerned—a relic of a time when the climate was different from now, when it was moister and cooler than the one we now enjoy.

As is well known the *Sequoia gigantea* is found only in groves in the Sierra at altitudes varying from 4000 to 7000 feet, roughly speaking. The northern grove is the lowest, the southern grove the highest in elevation. This shows that a certain altitude is required, or rather that certain conditions attending altitudes are needed, for the welfare of the tree. These conditions of altitude can be only two—heat and moisture.

The further north the lower must be the altitude in order to supply the necessary heat; the further south again the higher must be the altitude in order to give the necessary moisture. That the tree in order to propagate itself successfully is greatly dependent on these two factors, may be inferred by a study of the various localities where it is found. It is not necessary to enumerate these here—they have been already commented upon in

a former paper in this periodical, and are now well known. But from the inspection of the various localities we can draw some conclusions of general interest. All the groves are protected from the north winds more or less, and all face the south and west. All groves grow where moisture is abundant, always around springs, creeks, ponds or meadows, or at least in places where moisture never fails. If we inspect a single grove we always find the largest, handsomest and healthiest tree near the water, at the edge of a meadow or stream. The further away from the water the drier the soil, the smaller and poorer are the trees. This is an invariable fact in every grove. In many instances the largest and finest trees circle around a beautiful meadow, crowding each other, where space is available, or towering singly where there is only ground enough for one. This is, for instance, the case with the "Meadow Maid," in the Bear Creek grove, one of the handsomest and most symmetrical of all the Sequoias. This tree grows on a low knoll, in the midst of a meadow which is always boggy and water-soaked.

Sequoia trunks and cones have been dug up out of many wells on the plains of the Sacramento and San Joaquin Valleys, indisputable proof that the tree in former ages extended to the plains. With the advent of a drier and warmer climate the trees retreated to the hills, higher in the south, lower in the north. At last they became isolated groves, finally, in some localities, isolated trees. Only in the southern groves do we find an abundance of young trees; in some of the northern groves we search in vain for any seedlings. What conclusion can we draw from this? That the *Sequoia gigantea* delights in rich and wet soil, in sheltered positions, and that it occurs in groves. The folly of planting this tree in dry, exposed places, singly or in rows, as is now done everywhere in this State, as well as in other parts of the United States and in Europe, is therefore evident. The greater the failure, the dryer the soil where the tree is planted. Lately I passed an avenue of Sequoias which were all dying out. The cause lay near at hand—dry soil, no artificial irrigation, no rain for six months, hard adobe soil, full exposure to winds, the trees planted in rows or singly. If these trees had been set in groups of a hundred on rich, moist land, where irrigation can be

resorted to in the summer, they would have protected themselves and they would have thrived. They would have been real memorial trees, which might yet be telling of themselves and of those who planted them, in the year 5893.

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### FIELD NOTES AT SAN EMIDIO.

BY ALICE EASTWOOD.

The ranch lies at the foot of the chain of hills which connects the Sierra Nevada Mountains and the Coast Range. It is watered by the San Emidio Creek, which diffuses itself over the surrounding country and, perhaps, in the spring, may be said to empty into Buena Vista Lake. It is further south than any other inhabited house in the San Joaquin Valley, and the winters are much milder than in adjacent parts of Kern County.

The flora of the lower hills and plains is the same as that which characterizes the San Joaquin Valley. This season was unusually late and unfavorable, for the cold rains retarded vegetation. In the hills especially was the delay apparent. It was the end of March; but the twigs were only budding and the snow covered the side of San Emidio Mountain under the timber almost to its base.

Up on the low hills behind the ranch, the meadowlike summits were covered with flowers. The haze in the atmosphere threw a shadow of unreality over the distant Sierras, where the clouds hung low and the summits were white with the deep snow. Buena Vista Lake seemed so near. Not a tree hid its waters and only the shadows of low, barren hills rested on its bosom. It, too, seemed unreal—a phantom lake or a mirage in the enshrouding haze. The columns of dust that arose and slowly followed each other over the alkali desert were fit inhabitants of the weird scene.

These treeless uplands recalled the Alpine parks of the Rocky Mountains. Perhaps the green was not so deep, the flowers less abundant, and the species fewer in the same area. Certainly the coloring was not so rich and varied. The little streams that trickle from the snow-banks and gather volume as

they flow along were lacking; but the beauty was there, and the difference would be noticed only afterwards when the mind recalled former scenes. Then nothing could be more lovely.

The eye soon learns to distinguish the flowers, even at some distance, by means of the patches of color. "Alfilaria" is omnipresent, and where it monopolizes the soil a faint crimson tint prevails. Wherever the hills or plains are yellow over a considerable area, Baeria has crowded out all competitors. The bright yellow patches on steep hillsides, where there is little or no green, tell of Leptosyne. Glowing orange means Eschscholtzia; creamy white indicates "Creamcups" or Platystemon. Nemophila seems to have drawn bits of the sky to the earth here and there. Othocarpus adds vivid spots of deep crimson, and a peculiar white as of light chinchilla shows where *Gilia tri-color* carpets the ground. These are the most noticeable throughout the day; but at night almost all fold up their petals and go to sleep, and then when it looks as if the snow had suddenly fallen, *Gilia dichotoma* has awakened to keep the stars company.

*Nemophila insignis*, which everyone calls "Baby-Blue-Eyes," looks as innocent as its name. No one would guess what a struggle is going on within it. The pistils and stamens are at war and threaten to set up separate establishments. Here is one flower in which the pistil cowers down under the domineering stamens which rain down the pollen so that there can be no escape; but here is another blossom where the pistil proudly looks down upon the insignificant and completely subdued stamens. The buds show that the strife begins when the flower is born, and then it is that the supremacy of the male or female is decided.

*Meconopsis heterophylla* is the most conspicuous inhabitant of the flowery meadow, because of its brilliant color and comparative rarity. Sometimes a group of twenty or more will be seen, but more often they are fewer together or even solitary. The leaves are low down on the stem and therefore concealed by the other vegetation; the blossom is on a long, slender stalk and seems to be detached from the earth, and the bright red corolla deepening at the centre looks like a wavering flame hovering over the grass. It is fertilized in the bud.

*Eschscholtzia Californica* so glows with the sunbeams caught in its chalice that it diffuses light upon the other flowers and the grass. It will not shine unless the sun beams upon it but folds itself up and goes to sleep. It is fertilized in the bud.

*Platystemon Californicus* offers some unknown attraction to the bees. They ignore every other flower in their attentions to this creamy beauty. It, too, is fertilized in the bud. The petals and stamens persist until the pods are quite large.

*Gilia tricolor*, that most attractive little plant whose flowers the children call "Birds'-Eyes," has such a bright, cheerful look, such dainty coloring, so sweet a perfume, that none of the other blossoms can equal it in charm. When the light breezes pass over them they dance along the grass, look up so brightly and nod and smile. The flower is not fertilized in the bud but may be self-fertilized afterwards. The stigmas surpass the anthers, and when the blue pollen is being discharged the style branches are short and do not spread much. Later, they grow very long and curve around so as to meet the anthers.

At about four o'clock in the afternoon *Gilia dichotoma* begins to whiten the hillsides. Before expansion the flowers are hardly noticeable; the dull pink of the edges which are not covered in the convolute corolla hides their identity and makes the change, which takes place when they unveil their radiant faces to the setting sun, the more startling. They intend to watch all night and by sunset all are awake. In the morning they roll up their petals again when daylight comes on, and when the sun is well up all are asleep, tired out with the vigil of the night. The odor is most sickening. I watched them in the afternoon, at night, and in the early morning, and saw no insect approach. The stamens and pistil are deep down in the long tube of the corolla and it must generally be self-fertilized. The same flower opens several times and grows larger as it grows older.

Now, in the early morning, when *Gilia dichotoma* is about to retire, it is time for *Oenothera biortia* to awaken and act as sentinel through the day. It is not fertilized in the bud, but self-fertilization is possible, though the style is longer than the stamens. As the style is deflexed towards the lower part of the flower which faces the sun and is not erect until mid-day, it can

easily be seen how the pollen of one flower can fall upon its stigma. It goes to sleep earlier than the other flowers and is more regular in its habits. They sleep during the cold and wet; but it always unfolds somewhat at the proper time, though not entirely unless the sun shines brightly.

*Astragalus lentiginosus* is the favorite flower of the bumble bees. Some plants were collected with pistillate flowers, the stamens being small, separate, and with what seemed abortive anthers. It certainly was a singular freak for an *Astragalus*, but the peculiarity was common on the late shoots of plants already heavy with fruit. Later it was seen that the change was due to a fungus.

Of course there were many other flowers but they were neither particularly admired nor closely observed. A list would necessarily omit so many prevailing later that it would be unfair to the locality and is better omitted.

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### A NEW COLLINSIA.

BY S. B. PARISH.

*Collinsia Davidsonii*. Span high, cymosely few-branched, glabrous: leaves inch long, entire obtuse, ovate or oblong, the lower pedicellate, the floral linear-spatulate: verticils few (3-8) flowered: pedicels shorter than the calyx, this three lines high, scarious at base, the thickened obtuse lobes green: corolla moderately oblique, its upper lobe pale blue, or nearly white, transversely callous, the ample lobes few-toothed; lower lip equaling the upper, its lateral lobes violet, the keel white with dark tip: filaments beardless: gland stipitate, line high: capsule oval, not surpassing the calyx lobes; ovules four in each cell, seeds rugose.

Collected by Dr. Anstruther Davidson on the Mojave Desert; at Lancaster, May, 1893. Types in the Gray Herbarium and in my own. A handsome little plant which I have much pleasure in dedicating to its discoverer.



## NEW LOCALITIES FOR CALIFORNIA PLANTS.

BY T. S. BRANDEGEE.

In a region of such great extent as the State of California, so much of it yet wild and unvisited by botanists, we may hardly yet hope to have anything approaching a complete enumeration of the plants to be found within its borders. The distribution of the greater number of the species is, however, already approximately known, though fresh facts as they appear show us continually that the range of very many of them is much greater than has been supposed. The present paper is intended as a record of not only new forms, but of a very considerable number of extensions in range, some of them so unexpected and so far from previous stations as to be hardly credible without the evidence of the collector's specimens.

The data hereinafter given are largely drawn from collections made by Mr. William Vortriede in the Santa Lucia Mountains, in 1892, by Mr. L. Jared at Goodwin and Carisa Plain in the southeastern part of San Luis Obispo County from April to June of the present year, and by Miss Alice Eastwood, also in this year, in the mountains west and south of Bakersfield and west and north of Alcalde, and from the Mission of San Antonio through the coast mountains north to the Sur River. The names of other collectors are given after the stations of the plants collected by them. Where no name appears the collection has been in most cases made by the writer.

*Myosurus minimus* L. grows in very stout luxuriant form, the long receptacle often branching, about the marsh between Mt. Eden and Alvarado. It is nearly as abundant, but much more slender along the railway between Suisun and Vanden.

*Delphinium nudicaule* T. & G. Santa Lucia Mountains, Eastwood, Vortriede.

*Isopyrum occidentale* H. & A. Santa Lucia Mountains, Vortriede; Coburn Mills, Tulare County.

In the alpine region about Mt. Whitney there grows a yellow flowered *Aquilegia*, probably the one mentioned in the Botany of California as *A. cærulea*. It is common about Mt. Kaweah and there its yellow color often shades into red upon the spurs.

The lower the altitude at which it grows, the more the red appears. *Aquilegia truncata* with yellow centre and red spurs is abundant at lower elevations, and the higher the altitude the more yellow and the less red seems to be the rule, so that when following up a mountain brook a point was reached where it was difficult to distinguish the two species. This same alpine yellow columbine has been collected on other peaks near Mt. Whitney by Mr. Pixotto with the color on the spurs distinctly shading into blue. The scarlet flowered Eastern *A. Canadensis* has a yellow centre and is said in Gray's Manual to be rarely yellow all over, and a plant was found in Connecticut last year with entirely yellow flowers. A yellow-flowered *Aquilegia* grows near Manitou, Colorado, and specimens sent to Dr. Watson were named *A. cærulea*. These yellow-flowered specimens are noticed by Messrs. Meehan and Jones in Bot. Gazette iv, 248, and vi, 247, and the conclusion reached seemed to be that *A. cærulea* may have yellow flowers. These observations render the value of color uncertain in *Aquilegia*.

*Actæa spicata* var. *arguta* Torr. Coast south of the Sur, Eastwood.

*Pæonia Brownii* Dougl. Along the coast from Lower California to the Santa Lucia Mountains; Bartlett Mountain, Lake County.

*Vancouveria hexandra* Dec. Sur River, Eastwood.

*Streptanthus cordatus* Nutt. Along the trail to Dana's, Santa Lucia Mountains, Eastwood.

*Stanleya pinnatifida* Nutt. Santa Maria Mountains west of Bakersfield, Watts; Goodwin, Jared.

*Isomeris arborea* Nutt. Mountains west of Bakersfield, Eastwood; Goodwin, Jared.

*Oligomeris subulata* Boiss. Mountains west of Bakersfield, Priest Valley, Eastwood.

*Viola sarmentosa* Dougl. Santa Lucia Mountains, Vortriede; Sur River, Eastwood.

*Viola Sheltoni* Torr. Grizzly Peak, Trinity County, J. W. Blankinship; Snow Mountain, Lake County.

*Silene verecunda* Wats. San Carlos, Eastwood.

*Silene Palmeri* Wats. Near Mansfield, Santa Lucia Mountains, Eastwood.

*Arenaria congesta* Nutt. Mineral King, 1892.

*Polycarpon depressum* Nutt. Mountains near Santa Barbara, May, 1888. Also on Santa Cruz and Santa Catalina Islands.

*Lewisia rediviva* Pursh. Cantua Mountain, and Jolon, Eastwood; Ukiah, Mrs. M. E. P. McCowen; Hough's Springs, Lake County; Mountains of Fresno.

*Claytonia diffusa* Nutt. Mill Valley Cañon.

*Claytonia parvifolia* Moq. Mill Valley near the waterfall; Lagunitas Creek; Kneeland, Humboldt County, J. W. Blankinship.

*Sidalcea malachroides* (H. & A.) Bixby Creek, Monterey County, W. E. Bryant, 1889; Slate's, Santa Lucia Mountains, Eastwood; Eureka, Humboldt County, J. W. Blankinship, June, 1893.

*Claytonia saxosa*. Annual acaulescent: leaves broadly spatulate, all radical: scapes numerous, stout 8-10 mm. long, bearing at summit two broad, foliaceous bracts and an umbel of 2-6 flowers on pedicels usually much exceeding the scape: sepals oblong-orbicular 3-4 mm. long, spatulate-obovate, pale rose color nearly twice the length of the sepals: capsule exceeding the sepals 3-ovuled, 1-3 seeded; seeds large, foveolate in lines; cotyledons obliquely incumbent.

The plant though from an annual slenderly fusiform root bears considerable resemblance to *C. Megarrhiza*. It grows in dense succulent "balls" 1-3 inches in diameter on the shaly slopes of Snow Mountain, Lake County. Collected June 1891 and on Yolo Bolo in September 1892.

*Linum digynum* Gray. Sissons, Dr. Palmer.

*Linum spergulinum* Gray. Warthen and Lewis Creek, Eastwood.

*Erodium Texanum* Gray. Frequent and variable in the hills west of Bakersfield, Eastwood; and common about Alcalde.

*Oxalis Oregana* Nutt. Santa Lucia Mountains, *Vortriede*; Sur River, *Eastwood*.

*Flørkea proserpinacoides* Willd. Lassen's Peak, June, 1883, Mrs. R. M. Austin; head of Squaw Valley, July, 1886, C. F. Sonne; Susanville, July, 1892.

*Staphylea Bolanderi* Gray. Near Sequoia Mills, July, 1892.

*Lupinus cervinus* Kell. Santa Lucia Mountains, the locality where the type was collected by Lobb, *Eastwood*.

*Lupinus truncatus* Nutt. Slate's Hot Springs, Santa Lucia Mountains, *Eastwood*.

*Lupinus hirsutissimus* Benth. Sur River, *Eastwood*.

*Lupinus gracilis* Agardh. Santa Lucia Mountains, *Vortriede*. The solitary specimen is a foot in height, the lower, remote axils bear solitary pedunculate pods, and above, after a leafy interval of six inches, the usual subverticillate raceme.

*Hosackia crassifolia* Benth. Santa Lucia Mountains, *Eastwood*.

*Hosackia sericea* Benth. Jolon, *Eastwood*.

*Hosackia cytisoides* Benth. Santa Lucia Mountains, *Eastwood*; also at Hearst's Ranch, San Simeon.

*Hosackia grandiflora* var. *anthylloides* Gray. Santa Lucia Mountains, *Eastwood*; Goodwin, *Jared*; also on Tamalpais.

*Hosackia argophylla* Gray. Santa Lucia Mountains, Sur River, *Eastwood*.

*Trifolium longipes* var. *latifolium* Hook. Upper Mad River, Trinity County, J. W. Blankinship.

*Astragalus Purshii* Dougl. Cantua Mountains, *Eastwood*.

*Astragalus Spaldingii* Gray. Honey Lake, July, 1892.

*Psoralea Californica* Wats. Mt. Hepsidam, *Eastwood*; Bartlett Mountain, Lake County and near Leesville, Colusa County, 1884.

*Prunus emarginata* Walp. Santa Lucia Mountains, *Eastwood*.

*Prunus Andersoni* Gray, which is so abundant about Reno,

Nevada, grows scattered through the Sage Brush nearly to Susanville, California.

*Agrimonia Eupatoria* L. Not uncommon in Napa and Lake Counties.

*Carpenteria Californica* Torr. The most accessible station now known for this plant is reached by way of the road running northwest from Fresno across Big Dry Creek to the saw mills on Pine Ridge. It covers a hill about a mile above Toll House in the immediate vicinity of the "Grapevine Spring," at which the teams to the mills stop for water. From this locality, discovered by Dr. Gustav Eisen, the seed of most of the plants in cultivation in Europe was obtained. Mr. W. A. Sanders, of Sanders, collected it later near the same place.

*Jamesia Americana* T. & G. is not mentioned in the Botany of California but is noted in the Botany of King's Report as occurring as far westward as the Wasatch Mountains at an elevation of 7000 feet. It has been found in the Huachuca Mountains of Arizona, a locality distant from the Rocky Mountains of Colorado and New Mexico, where it is very common. Dr. Kellogg, according to the labels attached to the specimens, collected it in Mendocino County. Last summer the writer found it growing among the rocks in the alpine regions of Mt. Kaweah. The bushes were very small, hardly becoming a foot high, dwarfed probably by the climate of the high altitude of the habitat, and instead of the usual white color the flowers were bright pink.

*Whipplea modesta* Torr. Santa Lucia Mountains, *Vortriede*.

*Ribes Lobbii* Gray. Shady cañons, Pacific Valley and Sur River, *Eastwood*. Fruit very large. As Lobb is known to have collected in the Santa Lucia Mountains, this is probably the locality of the type.

*Eulobus Californicus* Nutt. Huron and Alcalde, *Eastwood*.

*Eucharidium Breweri* Gray. Loma Prieta, and Mt. Hamilton, *W. W. Price*, June, 1890; Priest Valley, *Eastwood*.

*Circæa Pacifica* Asch. & Mag. Bridgeville, Humboldt County, *J. W. Blankinship*.

*Mollugo verticillata* L. Newcastle, Placer County, May, 1883.

*Sesuvium Portulacastrum* L. Buena Vista Lake, Eastwood; Tulare Lake, Pyramid Lake, Nev. and frequent about the San Joaquin River near Lathrop.

*Cypselea humifusa* Turp. Collected by Dr. Parry at Aptos, Santa Cruz County, July, 1883. Very abundant about late dried clay depressions near the San Joaquin Bridge.

*Glinus Cambessidesii* Fenzl., Ann. Wien Mus. i, 358. The plant so identified at Harvard was collected by C. C. Parry at Chico in 1882, and was found two years later near Folsom. Plants answering better to the description of *Glinus lotoides* L. Sp., 463, were collected at the San Joaquin Bridge near Lathrop, October, 1891, and at Lakeport in August, 1892. The stamens in all the forms are commonly five and the seeds minutely tuberculate in lines. Their nomenclature both under *Glinus* and *Mollugo* seems much confused.

*Crantzia lineata* Nutt. River banks Antioch; Roberts Island; pools near the railway between Port Costa and Martinez, June, 1891 and 1892.

*Garrya Veatchii* Kell. San Emidio Cañon and New Idria, Eastwood. The species is apparently much too near *G. Fremonii*.

*Garrya elliptica* Dougl. Santa Lucia Mountains, Eastwood.

*Galium angustifolium* Nutt. Alcalde and New Idria, Eastwood; Santa Lucia, Vortriede.

*Pentachæta Lyoni* Gray. Goodwin, Jared. An anomalous form with the glabrous involucre of *P. aurea*, but the akenes more hirsute than in typical *P. Lyoni*, the bristles of the pappus often more than twenty.

*Bigelovia arborescens* Gray. Santa Lucia Mountains, Vortriede.

*Aster radulinus* Gray. Santa Lucia Mountains, Vortriede.

*Hymenodea salsola* T. & G. Goodwin, Jared.

*Encelia Californica* Nutt. Goodwin, Jared.

*Helianthus invenustus* Greene. Sequoia Mills, July, 1892. Stems numerous, eighteen to twenty-four inches in height, from a strong perennial root. A Balsamorhiza in habit, and no pappus found in any of the numerous plants examined.

*Madia Nuttallii* Gray. Santa Lucia Mountains, *Vortriede*; Sur River, *Eastwood*.

*Madia radiata* Kell. Alcalde, *Eastwood*. Abundant.

*Lagophylla filipes* H. & A. Rather widely spread through central and northern California. Guadalupe Mountain, Mariposa County, *J. W. Congdon*; San Antonio Creek, back of Mt. Hamilton, *Frank H. Vasil*; New York Ravine, El Dorado County; Tamalpais beyond the second summit.

*Whitneya dealbata* Gray. Prattville, Plumas County, July, 1892; Sequoia Mills, Tulare County, in the same month.

*Hulsea heterochroma* Gray. Road to Dana's, Santa Lucia Mountains, *Eastwood*; Tule River.

*Cacaliopsis Nardosmia* Gray. Santa Lucia Mountains, *Vortriede*; Little Sur River.

*Crocidium multicaule* Hook. Goose Lake, *Mrs. Austin*; Mariposa, *J. W. Congdon*.

*Arnica latifolia* Bong. Mt. Hamilton, June, 1890, *W. W. Price*; Santa Lucia Mountains, *Vortriede*.

*Phalacroseris Bolanderi* Gray. Sequoia Mills, July, 1892.

*Crepis occidentalis* Nutt. Cantua Creek, *Eastwood*.

*Picris Sprengeriana* Lam. Dict. iv. 310. Ukiah, *Mrs. M. E. P. McCowen*. A waif from the Mediterranean Region.

*Lactuca Scariola* L. is becoming common about Lake and Upper Napa Counties and about the Sacramento River.

*Campanula exigua* Rattan. Bot. Gaz. xi, 339, (1886). Priest Valley, *Eastwood*.

*Parishella Californica* Gray. Goodwin, *Jared*.

*Howellia limosa* Gray. In ponds near Blocksburg, Humboldt County, *J. W. Blankinship*, June, 1893; previously known only from the Willamette River, Oregon.

*Pleuricospora fimbriolata* Gray. Mill Creek, near Healdsburg, *Miss Effie McIlriach*.

*Trientalis Europæa* var. *latifolia* (Hook.) Pacific Valley, *Eastwood*.

*Cycladenia humilis* Benth. Santa Lucia Peak, *Eastwood*;

Cobb Mountain, Lake County, C. F. Leithold, June, 1893;  
Snow Mountain, June, 1891.

*Swertia perennis* L. was collected at Mineral King, August, 1892, by Miss Faustina Butler.

*Gilia Bigelovii* Gray. New Idria, Eastwood; Tehachapi.

*Gilia lutescens* Stend. Common in the Santa Lucia Mountains, Vortriede, Eastwood.

*Gilia Schottii* Gray. Alcalde, Eastwood.

*Hydrophyllum occidentale* Gray. Mt. San Carlos, Eastwood.

*Phacelia humilis* T. & G. Hernandez and New Idria, Eastwood.

*Phacelia circinatiformis* Gray. Hite's Cove, Mariposa County, Congdon; Mt. Hamilton, W. W. Price, 1890.

*Phacelia lasaefolia* Torr. Common from San Simeon to the Sur River, Eastwood, Vortriede.

*Phacelia grisea* Gray. Santa Lucia Mountains, Vortriede; Little Sur River.

*Phacelia Parryi* Gray. Between King's City and Jolon, Vortriede, Eastwood.

*Phacelia Fremonti*. Huron, Eastwood; Alcalde.

*Phacelia affinis* Gray. San Carlos Mountain, Eastwood. A small form.

*Lemmonia Californica* Gray. Alcalde, Eastwood; Kernville, 1891.

*Nama Parryi* Gray. Goodwin, San Luis Obispo County, Jared. Leaves all entire.

*Eritrichium Torreyi* Gray. Buena Vista Hills, Eastwood; Alcalde.

*Datura Stramonium* L. Both the white and violet colored (*D. Tatula*) are abundant in Lake County, especially about Upper Lake. *D. Tatula* is not uncommon in Marin County; but *D. Stramonium* is the common form of the Sacramento Valley.

*Verbascum Blattaria* L. has long been abundant in California. It is found in the foothills above Sacramento; along the San



Joaquin, especially about Robert's Island; in Lake County, and even on Redwood Peak, back of Oakland. Specimens are also in the herbarium of the Academy of Sciences from Sisson, collected by Dr. Palmer, and from Big Meadows, collected by J. G. Lemmon, in 1880.

*Collinsia Childii* Parry. Santa Lucia Mountains, *Vortriede*.

*Mimulus Palmeri* Gray. Santa Lucia Mountains, *Vortriede*; Ben Lomond.

*Mimulus Congdoni* Wats. grows under the shade of *Ceanothus* bushes not far from the Lagunitas water-tank on the North Pacific Coast Railway. It much resembles *M. latifolius* Gray, of the islands off the coast of California and Mexico.

*Mimulus Bolanderi* Gray. Tehachapi; Santa Lucia Mountains, *Vortriede*.

*Pentstemon Palmeri* Gray. Lewis Creek and New Idria, Eastwood.

*Veronica Buxbaumii* Ten. Woodland, J. W. Blankinship.

*Castilleja plagioloma* Gray. Alcalde, Eastwood; Goodwin, Jared.

*Orthocarpus gracilis* Benth. Santa Lucia Mountains, *Vortriede*. It seems not to have been collected since the time of Nuttall.

*Aphyllon comosum* (Hook.) is extraordinarily abundant in the low, overflowed lands between the San Joaquin and Paradise Cut about and beneath the railway trestle. It there blooms in August and September, both the plant and the flower unusually large, and from white through shades of lavender to purple. It seems there to be always parasitic on *Grindelia*.

*Boschniakia strobilacea* Gray has been brought from Willett's, Mendocino County, by Dr. Mary G. Campbell; and from Applegate in southern Oregon, by Mrs. H. S. Durden. It appears to grow always upon roots of *Manzanita*.

*Utricularia vulgaris* L. Blocksburg, Humboldt County, J. W. Blankinship; near San Joaquin Bridge; ponds near Olema.

*Acanthomintha lanceolata* Curran. Specimens of this plant obtained recently show that it is not nearly so widely separated

from *A. ilicifolia* as had been supposed, and it will not be surprising if fuller collections quite bridge the gap between them. Specimens collected by Jared, near Goodwin, have the upper lip of the pubescent corolla truncate, entire; middle lobe of the lower shortly two-lobed; anthers four, two-celled, not truly confluent, all woolly filaments nearly of equal length. A specimen collected by Lobb, at San Antonio, has the upper lip entire, middle lobe of the lower lip rather long and broadly spatulate; the four anthers woolly, nearly equal. A similar specimen collected by Mr. J. B. Hickman, somewhere in Monterey County, has the middle lobe of the lower lip narrower and the posterior anthers smaller on shorter filaments. Specimens by Miss Eastwood, from Priest Valley, have the upper lip of the glabrous corolla very shortly two-lobed, lobes of the lower lip nearly equal, the middle one linear somewhat pointed; anthers glabrous the posterior on much shorter filaments. Specimens from Warthen and Hernandez have pubescent corolla, both the upper lip and the somewhat obovate middle lobe of the lower lip emarginate; anthers somewhat woolly. Specimens from Mt. Hamilton, 1890, collected by W. W. Price, have the upper lip still more deeply lobed than the type, the lobes emarginate, middle lobe of the lower lip considerably longer than the lateral, emarginate and erose.

*Monardella nana* Gray. Santa Lucia Mountains, *Vortriede*; Little Sur, 1888.

*Monardella Breweri* Gray. Santa Lucia Mountains, *Vortriede*, *Eastwood*.

*Audibertia humilis* Benth. Santa Lucia Mountains, *Vortriede*.

*Trichostema lanatum* Benth. Santa Lucia Mountains, *Vortriede*, *Eastwood*.

*Lamium amplexicaule* L. Near Ione, May, 1886, and along the railway between Mt. Eden and Alvarado, June, 1893.

*Melissa officinalis* Tourn. (Common Balm.) San Rafael Water Works, *John McLean*; waysides, Santa Rosa; both in 1892.

*Nepeta Cataria* L. (Catnip.) Ager, July, 1887; Scott Valley, Lake County, abundantly in 1892.

*Nepeta Glechoma* Benth. Rather common about low lands in the Sacramento Valley.

*Salvia Æthiopsis* L. Established along the roadsides in Susanville, July, 1892.

*Leonurus Cardiaca* L. Oregon City. "Lobb."

*Abronia villosa* Wats. Alcalde, Eastwood.

*Mirabilis laevis* Benth. Pacific Valley, Eastwood; Alcalde.

*Phytolacca decandra* L., recently recorded from Los Angeles County, was observed by Frank H. Vaslit on Cow Mountain, in the northern part of Lake County, in 1885. It is very abundant along the California & Oregon Railway in the Siskiyou Mountains. Blue Lakes, Lake County, J. W. Blankinship.

*Eriogonum inflatum* Torr. Goodwin, Jared.

*Eriogonum trichopodium* Torr. Alcalde, Eastwood.

*Chorizanthe perfoliata* T. & G. Alcalde.

CHORIZANTHE VORTRIEDEL. Annual, reddish, prostrate, minutely glandular, but otherwise glabrous: leaves spatulate; bracts three-parted, shortly spinulose, small; nodes of the stem elongated: involucre 5 mm. long, quadrilateral, slightly saccate at base, shortly cleft into four equal lobes tipped with very short, erect spines, which are either straight or slightly hooked at tip: flowers long-pedicellate, two in each involucre; perianth exserted, lower half yellow, upper rose-color; segments deeply bilobed, the lobes lanceolate and somewhat spreading: stamens, nine.

The specimens are too young to admit of a description of the seed. In age they would probably be of considerable size, the spreading branches in some of the specimens having already attained a length of six inches or more. It is nearest *C. Thurberi* (Benth.) Collected in the Santa Lucia Mountains by William Vortriede in June, 1892, and by Miss Eastwood in June, 1893.

*Chorizanthe Thurberi* Watson. Alcalde, Eastwood, involucre, 8 mm. long.

*Chorizanthe stalicoides* Benth. Alcalde, Eastwood.

*Chorizanthe uniaristata* T. & G. Alcalde, Eastwood.

*Chorizanthe polygonoides* T. & G. Antioch; Livermore; Laundry Farm near Oakland; Tamalpais.

*Chorizanthe insignis* Curran. Jolon, Eastwood; Santa Lucia Mountains, Vortriede; frequent in the range.

*Eurotia lanata* Moq. Goodwin, Jared.

*Euphorbia hirtula* Engelm. Nacimiento River, Eastwood.

*Ephedra Nevadensis* Wats. Hills west of Bakersfield, Eastwood; Goodwin, Jared.

*Cephalanthera Oregana* Reich. Santa Lucia Mountains, Vortriede.

*Allium Parryi* Wats. Mt. Hepsidam Range, Eastwood.

**CHLOROGALUM PURPUREUM.** Bulb ovoid, 2-3 cm. in diameter, membranously coated: stem  $\frac{1}{3}$ - $\frac{1}{2}$  m. high paniculately branched: leaves rather narrow, linear, undulate: pedicel as long or longer than the perianth: perianth not vespertine, about 1 cm. in breadth, spreading from above the base; segments oblong-ovate with strong midnerve: stamens as long as the segments, spreading; filaments filiform purple: anthers yellow: style as long as the stamens, curved to the side: ovary sessile, ovules one in each cell.

A very handsome species, the numerous flowers purplish blue. Nearest *C. parviflorum*. Collected in the Santa Lucia Mountains in 1892, by William Vortriede; in 1893 in much better specimens by Miss Eastwood.

*Chlorogalum angustifolium* Kell. Mormon Island, Sacramento County; Tuolumne County near Big Oak Flat; between Ione and Carbondale; Round Valley, Mendocino County, J. W. Blankinship.

*Fritillaria pluriflora* Torr. Capay Valley, Yolo County, March 23, 1893, J. W. Blankinship. Seldom collected, flowers very handsome more than an inch long.

*Odontostomum Hartwegi* Torr. Near Napa, A. W. Robinson, 1892.

*Prosartes Hookeri* Torr. Santa Lucia Mountains, *Vortriede*.

*Clintonia uniflora* Kunth. Sequoia Mills.

*Clintonia Andrewsiana* Torr. Santa Lucia Mountains, *Vortriede*, Eastwood.

*Lysichiton Kamtschalcensis* Schott. Santa Cruz Mountains near Boulder Creek, *W. G. Farlow*.

*Nitella clavata* var. *inflata*. In Echo Lake, Santa Catalina Island, May, 1890.

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## ADDITIONS TO THE FLORA OF SOUTHERN CALIFORNIA.

BY S. B. PARISH.

Since the completion of the Botany of the Geological Survey a considerable number of plants have been detected which were not then known to grow within the limits of the State, and the range of others has been found to be much more extensive than is indicated in that work. Probably these additions and extensions have been more numerous in the southern counties than elsewhere. Owing to the premature discontinuance of the survey the botanical exploration of these counties was less thorough than in the upper part of the State, which then contained a far larger proportion of the total population than at present. With a single notable exception the South was also entirely without local botanists, Mr. Daniel Cleveland having been for years the only resident cultivator of the science. It was not until near the completion of the second volume that a few records are made based on the collections made by Rev. J. C. Nevin and Mr. W. G. Wright, and the explorations of Parry and Lemmon. Since then the knowledge of the southern flora has been greatly enlarged by others who have become residents of the region, among whom may be mentioned Mr. W. S. Lyon, Mr. C. R. Orcutt, Dr. H. E. Hasse, Dr. A. Davidson and Prof. A. J. McClatchie.

This botanical activity has resulted in the discovery of a number of new species, and the extension to this region of others.

Some of these extensions have been noted in the last volume of the Synoptical Flora, or in recent monographs and other papers. A considerable number, however, remain as yet unrecorded, and some of the more interesting of these are given in the following list, which makes no pretense to completeness, and, indeed, might easily be considerably enlarged. The place of publication is cited for these species not enumerated in the Botany of the Survey, and these are additions to the flora of the State, as well as to that of Southern California. The others extend the range of more northern plants not heretofore recorded from the southern counties. With the exception of a few rare species none of those are included whose previously known range was south of the latitude of San Francisco.

Phytographically these northern plants belong to the Sierra Nevadan flora, and they form most of the additions to the vegetation of our higher mountains. The Sonoran flora of the arid regions to the east, Nevada, Arizona, Utah, has supplied the additional desert plants, and some of those which climb the desert flanks of the mountains. The stations for the first class are in many cases the southern limit of the species, and those for the second class the western or northern limit. Some exceptional plants will be noticed by the reader. All stations recorded are authenticated by specimens in the herbarium of the writer, and when no other collector's name is cited his is to be understood.

*Myosurus apetalus* Gay, Fl. Chil. i, 31. Borders of lake, Bear Valley, in San Bernardino Mountains, altitude 6000 to 7000 feet.

*Ranunculus Eschscholtzii* Schlecht. Anamad. Ranunc. ii, 16. Summit of Grayback Mountains, altitude 11,725 feet, *W. G. Wright*.

*Ranunculus alismæfolius* Geyer, var. *alismellus*, Gray. Tauquitz Meadows, San Jacinto Mountains, *Dr. H. E. Hasse*.

*Arabis Ludoviciana* C. A. Meyer, Ind. Sem. Petr. ix, 60. San Diego, *D. Cleveland*.

*Caulanthus procerus* Wats. Northern slope of San Bernardino Mountains, at about 6000 feet altitude, Bear Valley road.

*Nasturtium sphaerocarpum* Gray, Pl. Fendl. 6. Mouth of Santa Ana Cañon, San Bernardino Mountains.

*Cleomella oöcarpa* Gray. Rabbit Springs, Mojave Desert.

*Viola blanda* Willd. Not uncommon about cold springs in the San Bernardino Mountains, at from 5000 to 7000 feet altitude.

*Viola chrysantha* Hook. Common in moist sands from Bear Valley to head of Cañon Diablo, San Bernardino Mountains.

*Silene Mensiesii* Hook. Stream banks, Bear Valley.

*Stellaria borealis* Bigelow. Cold bogs, Bear Valley.

*Sagina occidentalis* Wats. Streets of Los Angeles, *Hasse*; hillsides, Santa Monica, *Davidson*; Santa Catalina Island, *Lyon*.

*Sagina Linnæi* Presl. Cold bog, near Bear Valley dam.

*Lewisia rediviva* Pursh. Bear Valley; San Antonio Peak.

*Lewisia brachycalyx* Engelm. Meadows, Bear Valley.

*Bergia Texana* Seub. Inlet of Elsinore Lake, Riverside County.

*Horsfordia Newberryi* Gray, Proc. Am. Acad. xxii, 297.  
*Abutilon Newberryi* Wats. Bot. Calif. i, 87. Rocky ravines at Toros, on the Colorado Desert.

*Linum micranthum* Gray. Newhall, *Davidson*.

*Ayenia pusilla* L. Cañons at Agua Caliente (Palm Springs), Colorado Desert.

*Geranium cæspitosum* James, Long's Exp. ii, 3. Bear Valley, *Parish*; Tauquitz Valley, *Hasse*.

*Condalia spathulata* Gray, Pl. Wr. i, 32. Mountains of the Colorado Desert near Mesquite Station, *W. F. Parish*.

*Glossopetalon spinescens* Gray, Pl. Wr. ii, 29, t. 12. Northern slope of San Bernardino Mountains, near Cushenberry Springs.

*Acer glabrum* Torr. Headwaters of Mill Creek, San Bernardino Mountains.

*Psoralia castorea* Wats. Proc. Am. Acad. xiv, 291. Sand hills at Camp Cady, Mojave Desert.

*Astragalus Preusii* Gray, Proc. Am. Acad. vi, 222. Sand hills at Dos Palmos, Colorado Desert.

*Hoffmanseggia stricta* Benth. in Gray, Pl. Wr. i, 56, ii, 50. Gravelly plains at San Felipe, Colorado Desert.

*Hoffmanseggia microphylla* Torr. Mex. Bound. 50. Dry washes of the Colorado Desert; Toros; Indian Wells; Agua Caliente.

*Calliandra eriophylla* Benth., Lond. Jour. Bot. iii, 105. Colorado Desert near Mesquite Station, *W. F. Parish*.

*Ivesia santolinoides* Gray. Holcomb Valley, San Bernardino Mountains, at 7500 feet altitude.

*Tellima tenella* Walp. Bear Valley, San Bernardino Mountains.

*Ribes cereum* Dougl. Bear Valley, *Parish*; Tauquitz Valley, *Hasse, Parish*.

*Sedum spathulifolium* Hook. Big Meadows, San Bernardino Mountains, *Wright*.

*Cotyledon Nevadensis* Wats. Common on southern slope of San Bernardino Mountains, at from 2000 to 4000 feet altitude.

*Lythrum Hyssopifolia* L. Sp. Pl. 447. River bed at San Diego, *Cleveland*.

*Eriogonum Palmeri* Wats. Proc. Am. Acad. xii, 251. Mojave Desert, from Antelope Valley to Rabbit Springs, *Davidson, Hasse, Parish*.

*Mentzelia congesta* T. & G. Mojave Desert, probably near Rock Creek.

*Mentzelia Wrightii* Gray, Pl. Fendl. 48. Mammoth Tank, Colorado Desert, *W. F. Parish*.

*Petalonyx nitidus* Watson, Am. Nat. vii, 300. Cushenberry Springs.

*Symphoricarpos oreophilus* Gray. San Bernardino Mountains, at about 6000 feet altitude; Bear Valley; Mill Creek Falls.

*Peucedanum villosum* Nutt. Acton, *Hasse*.

*Galium Rothrockii* Gray, Proc. Am. Acad. xvii, 203. Syn. Fl. I, ii, 39. Colorado Desert, probably at Mountain Springs.



*Galium stellatum* Kellogg, Proc. Calif. Acad. ii, 77. Crevices of dry cliffs, Agua Caliente.

*Brickellia atrectyloides* Gray, Proc. Am. Acad. viii, 290. Crevices of cliffs; Vallecito; Agua Caliente; Cushenberry Cañon.

*Aplopappus lanceolatus* T. & G. Fl. ii, 241. Meadows at Bear Valley and Holcomb Valley.

*Antenaria alpina* Gærtn. Summit of Grayback Mountain, Wright.

*Hemizonella Durandi* Gray. Common in the San Bernardino Mountains, at from 4000 to 5000 feet altitude.

*Senecio eurycephalus* T. & G. Dry ridges at summit of Tejon Pass. Insufficient specimens from Wilson's Peak, Davidson, may belong here.

*Microseris Douglasii* Gray. Meadows at Elizabeth Lake.

*Downingia pulchella* Torr. Cuyamaca Mountains.

*Bryanthus Breweri* Gray. Big Meadows in the San Bernardino Mountains, Wright.

*Chimaphila Menziesii* Spreng. Mill Creek Falls, San Bernardino Mountains.

*Pyrola picta* Smith. Near the summit of San Antonio Peak.

*Pterospora andromedea* Nutt. Common in open pine forests in the San Bernardino and San Jacinto Mountains, at from 4000 to 8000 feet altitude.

*Forestiera Neo-Mexicana* Gray, Proc. Am. Acad. iv, 304. Mojave Desert; Lancaster, Davidson; Rock Springs; Rabbit Springs, Parish.

*Amsonia tomentosa* Torr. Fremont's Rept. 2d Ed. 316, Cactus Station, Cushenberry Cañon.

*Astephanus Utahensis* Engelm. Am. Nat. ix, 349. Gravelly plains, San Felipe.

*Gentiana simplex* Gray. Little Bear Valley, San Bernardino Mountains.

*Gentiana Amarella* Linn. var. *acuta* Hook. f. Bear Valley.

*Gilia Bigelovii* Gray, Proc. Am. Acad. viii, 265. Morongo Pass.

*Gilia Breweri* Gray. Bear Valley.

*Gilia latifolia* Wats. Am. Nat. ix, 347. Warm Springs on the Mojave Desert.

*Phacelia Lemmoni* Gray, Syn. Fl. II, i, 417. *P. heterosperma*, Parish, Bot. Gaz. xiii, 37. Rock Creek, Mojave Desert.

*Triardia Watsoni* Torr. Agua Caliente, Davidson, Parish. Abundant near Cushenberry Springs.

*Nama stenocarpum* Gray, Proc. Am. Acad. x, 331. Santa Monica, Hasse.

*Nama Rothrockii* Gray. Holcomb Valley.

*Coldenia canescens* DC., Prod. ix, 559. Mesquite Cañon, Colorado Desert, W. F. Parish.

*Harpagonella Palmeri* Gray. Mesas near San Diego, Parry.

*Krynitzkia leucophæa* Gray. Abundant near Cushenberry Springs.

*Cuscuta obtusifolia* HBK. var. *glandulosa* Engelm. Trans. St. Louis Acad. i, 492. On Polygonum, San Bernardino.

*Cuscuta denticulata* Engelm. Cushenberry Springs.

*Pentstemon breviflorus* Lindl. Lancaster, Davidson.

*Pentstemon Eatonii* Gray. Cushenberry Cañon.

*Pentstemon pumilus* Nutt., var. *incanus* Gray, Syn. Fl. II, i, 259. Aguanga, San Jacinto Mountains.

*Pentstemon ambiguus* Torr. Ann. Lyc. N. Y. ii, 228. San Felipe.

*Pentstemon Bridgesii* Gray. Mill Creek Falls.

*Veronica alpina* L. San Jacinto Mountains.

*Utricularia vulgaris* L. Bear Valley.

*Martynia altheaefolia* Benth., Bot. Sulph. 38. Vallecito.

*Lippia lanceolata* Mich. Fl. ii, 15. Los Angeles, Hasse; San Bernardino.

*Sphacele calycina* Benth. var. *Wallacei* Gray. Wilson's Peak, Davidson.

*Boerhavia viscosa* Lag. Andrea's Cañon, near Agua Caliente.

*Abronia nana* Wats. Proc. Am. Acad. xiv, 294. Bear Valley.

*Polygonum emersum* Britt., Trans. N. Y. Acad. Sci. viii, 73; Small, l. c. 359. San Diego, Cleveland.

*Polygonum incarnatum* Ell. Sk. i, 456, Small, l. c. 358. Los Angeles, Davidson.

*Eriogonum Parryi* Gray, Proc. Am. Acad. x, 77. Mojave Desert, Warm Springs.

*Eriogonum Kennedyi* Porter. Bear Valley, near Beardstown.

*Eriogonum microthecum* Nutt. Bear Valley.

*Eriogonum Plumatella* Dur. and Hilg. Mojave Desert; Rabbit Springs, etc.

*Oxytheca Watsoni* T. & G. Near Cushenberry Springs.

*Euphorbia eriantha* Benth. Agua Caliente, Davidson, Parish.

*Callitriche marginata* Torr. Santa Monica, Hasse.

*Callitriche verna* L. Julian; Bear Valley; Little Bear Valley.

*Myrica Californica* Cham. Santa Monica, Hasse, Lyon.

*Salix cordata* Muhl., var. *Watsoni* Bebb. Bear Valley.

*Salix flavescens* Nutt. Bear Valley Toll Road, Parish; Grayback Mountain, Wright.

*Arceuthobium divaricatum* Engelm. On *Pinus monophylla*, Cushenberry Cañon; Cox's Ranch.

*Lilium pardalinum* Kellogg. San Bernardino, Wright.

*Calochortus clavatus* Wats. Los Angeles, Davidson.

*Calochortus flexuosus* Wats. Am. Nat. vii, 303. Rev. Lil. 266. Cushenberry and Rabbit Springs.

*Potamogeton fluitans* Roth. *P. lonchites* Tuckerm. Near Colton.

*Potamogeton natans* L. Bear Valley.

*Potamogeton pectinatus* L. Elsinore Lake, McClatchie, Parish; Los Angeles, Nevin; San Bernardino; Bear Valley.

*Sagittaria calycina* Engelm., Gray's Man. 5th Ed. 492. Coyote Creek, near Anaheim.

*Juncus Leseurii* Bolander. Waterman's Cañon, near San Bernardino; Fallbrook.

*Juncus obtusatus* Engelm. Little Bear Valley.

*Juncus Mertensianus* Meyer. Head of Mill Creek.

*Carex straminea* Schk., var. *mixta* Bailey, Proc. Am. Acad. xxii, 151. Waterman's Cañon.

*Carex Deweyana* Schw., var. *Bolanderi* W. Boott. Mill Creek Falls.

*Carex festiva* Dewey. Bear Valley.

*Andropogon macrourus* Mich. Foothills near San Bernardino.

*Alopecurus geniculatus* L., var. *aristulatus* Munro. Bear Valley.

*Stipa occidentalis* Thurb. Mill Creek Falls.

*Muhlenbergia Texana* Thurb. Coult. Man. Rocky Mountain Bot. 410. Vallecito.

*Sporobolus gracillimus* Scrib. Grayback Mountain, Wright.

*Agrostis scabra* Willd. Bear Valley.

*Deschampsia calycina* Presl. San Gabriel, Hasse; Bear Valley.

*Triodia pulchella* HBK. Mesquite Cañon, W. F. Parish.

*Poa Bigelovii* V. & S. Agua Caliente, Davidson.

*Glyceria nervata* Trin. Little Bear Valley.

*Equisetum laevigatum* Al. Br. Common at San Bernardino.

*Cryptogramme acrostichoides* R. Br. Big Meadows, Wright.

*Woodsia Oregana* Eaton. Grayback Mountain, Wright; Lower Holcomb Valley, W. F. Parish.

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ROMNEYA COULTERI Harv. Mrs. Ida M. Blochman, of Santa Maria, has recently obtained this plant on the Cuyama or Santa Maria River, "growing right on the river looking across into San Luis Obispo County." It has not yet been reported nearly so far north.

## SIERRA NEVADA PLANTS IN THE COAST RANGE.

BY KATHARINE BRANDEGEE.

The great valley of California is a basin or plain irregularly elliptical in shape and about five hundred miles in length by one hundred in breadth. It is rimmed all around with mountains, the only opening being that from which all the waters of the basin escape to the sea. The northern half of the valley, drained by the Sacramento and its tributaries, is called the Sacramento Valley; the southern half, drained by the river of that name, is called the Valley of the San Joaquin. The slope of the land is to the centre, where the two rivers meet and pour their mingled waters into the Bay of San Francisco. The rim of the valley is highest where the Sierra Nevada makes its eastern wall, even the Truckee Pass, where the Central Pacific Railroad crosses it, being over seven thousand feet in altitude. The southern wall, formed by the Tehachapi Range, is nearly four thousand feet in its lowest passes; the northern, formed by the Shasta Range is but little less, and the western, though lower, is double, with a long valley or series of valleys intervening, the inner, at least in the northern half, having many peaks of considerable altitude, Yolo Bolo being over eight thousand feet, Sanhedrim, Hull and Snow Mountain between six and seven thousand.

Seeds transported by whatever agency must find suitable conditions or they will not thrive, and to this fact, of course, we owe the diversity of flora still existing. The broad hot valley of California offers no suitable home for the plants of the Sierra and they cannot cross it. The valley plants cannot endure the cold of the mountains, and if they flourish for a season even their seeds succumb to the winter frosts.

It is perhaps from a consideration of the barrier interposed by this valley that the flora of the Sierra Nevada has been considered to be so different from that of the Coast Range that surprise is often expressed at the finding of additional species common to both. It is, however, easily understood that plants may follow the valley wall in any direction and for a distance limited only by comparative height and consequent degree of heat.

The localities of plants should be observed and recorded at

the earliest possible date. Man brings with him so many disturbing elements that a few years may almost change the face of nature. Of these disturbing factors, one of the greatest is a flock of sheep. Not only does it destroy or render very scarce many of the native plants, but in California, where sheep are kept on the public domain, they are fed in the spring months on the foothills, are driven to the high mountains as the season advances, and back as the snow threatens, to the stubble fields and tule marshes of the lowlands. In these peregrinations they distribute in varying proportion the seeds of many of the plants growing in the regions passed over. There is scarcely a spot except upon the highest peaks, where sheep have not penetrated and altered to some extent the character of the flora.

The railway lines are another potent factor in the disturbance of distribution, the construction trains, which transport rock and earth for embankments, offering special facilities for the wandering of species, but their action being more definite and much more recent, is in most cases readily understood and causes no confusion, as for instance in the invasion of the San Joaquin Valley by the plants of the Mojave Desert now in active progress.

The species enumerated below are in most cases additions to the known flora of the Coast Range or have their range much extended southward. It does not comprise all the additions collected, the grasses, Cyperaceæ, etc., being neglected, and even of the other orders a considerable number have escaped reckoning on account of the distribution of the plants in the herbarium, no list having been made, and only those included which could be recalled from memory and readily verified. The greater part of them were obtained from Snow Mountain in Lake County in two visits; one made by Mr. Brandegee in June, 1891; the second by the writer late in August, 1892.

Snow Mountain is in Lake County and nearly due north a little more than a hundred miles from San Francisco. It rises to a height of nearly 7000 feet, and the depth of the winter snow and the degree of cold is apparently quite as great as at the summit of the Donner Pass in the central Sierra Nevada. The plants are still insufficiently known, the top being covered with snow

drifts at the date of the earlier visit, while at the later one the sheep had nearly finished all that were to their taste. No one lives on the upper part of the mountain, but there are remains of old cabins at the summit meadows, where the shepherd pitches his tent for the late summer when the flocks are driven up from the lower slopes. In the clear cold streams which run down its gorges to join the south fork of the Eel River, trout abound and deer are a common sight, and venison is familiar food to the visitor.

The landscape forcibly reminds of the Sierra Nevada. The small lakes and boggy meadows are bordered by *Veratrum* and alpine asters, and spangled with white violets and the primrose *mimulus* all hoary with dew-entangled hairs. The upper slopes and dry valleys are covered with forests of white cedar, fir and "Jeffrey's pine," surrounded by thickets of the bitter cherry (*Prunus emarginata*) and the "snowbush" (*Ceanothus cordulatus*), while the peaks and ridges and the dry uplands of the meadows are brightened by the scarlet *Gilia aggregata*, the well-known "pussy's paws" (*Spraguea umbellata*), the brilliant yellow *Eriogonum umbellatum*, the broad tufts of purple and white *E. ovalifolium*, and the fluffy rose-colored balls of the most beautiful of all the species, *E. Lobbii*.

A few additions to the coast flora were made by Mr. Brandegee in a visit of a single day, late in September, to the Yolo Bolo.\* The mountain had been at that date so ravaged by sheep, that no food whatever remained for the horses, and the trip was brought to an untimely conclusion.

Mr. C. F. Leithold, a student of the Stanford University, made in June of the present year a collection of the plants of Cobb Mountain, in Lake County, a few miles north of Mt. St. Helena. Its flora is almost the same as that of the neighboring mountain, but *Abies concolor* is found upon it.

The general level of Lake County is of considerable altitude, Clear Lake which occupies its centre being about 1500 feet, so that the elevation of the mountains above the level of the sea is a good deal greater than their apparent height. Bartlett

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\* Called on the maps "Yallo Ballo," but pronounced as above by the people of the vicinity.

Mountain which rises steeply from the northeastern shore of the lake is about 4000 feet altitude. Mt. Hanna, often called "Bottle Glass Mountain" from the quantity of obsidian found upon it, is some distance away from the lower end of the Lake, on the western side, and its elevation is considerably less. The plants of the Sierra Nevada found on these mountain tops differ somewhat, in most cases, from those of the original locality, a difference easily to be explained by their isolation and difference of the soil. Micromorphic botanists may indeed insist that the differences between these plants found on the massive granite of the Sierras and those on the many-colored shales of Snow Mountain are sufficient to constitute species.

*Ranunculus alismæfolius* var. *alismellus* Gray. Borders of meadows, Snow Mountain, June.

*Argemone hispida* Gray. Summits of Snow Mountain, evidently brought there by the sheep.

*Arabis platysperma* Gray. Snow Mountain.

*Vesicaria montana* Gray. Snow Mountain.

*Viola blanda* Willd. Meadows, Snow Mountain.

*Viola aurea* var. *venosa* Wats. Snow Mountain, June.

*Viola Sheltoni* Torr. Snow Mountain, June.

*Polygala cornuta* Kell. Proc. Cal. Acad. i, 61. *P. Californica* of Bot. Cal. Snow Mountain.

*Silene Menziesii* Hook. Snow Mountain.

*Arenaria verna* L. var. *hirta* Wats. High rocky ridges, Snow Mountain; Yolo Bolo.

*Claytonia Chamissonis* Esch. Cold bogs and streamlets, Snow Mountain.

*Spraguea umbellata* Torr. Snow Mountain.

*Sidalcea Oregana* Nutt. Snow Mountain. The Sierra Nevada form.

*Ceanothus prostratus* Benth. On Mt. St. Helena in the form described as *C. divergens* Parry. On Cobb and Snow Mountains quite as prostrate as in the Sierra Nevada.

*Ceanothus velutinus* Dougl. From Mt. St. Helena, where it



grows abundantly a short distance back of the Toll House, northward, but not seen on Snow Mountain.

*Ceanothus cordulatus* Kell. A prevailing shrub in the thickets near the top of Snow Mountain.

*Lupinus laxiflorus* Dougl. Snow Mountain.

*Trifolium cyathiferum* Lindl. Snow Mountain; also collected by Mr. J. W. Blankinship in Big Valley, Lake County.

*Hosackia stipularis* Benth. Cobb Mountain. An exceedingly glandular form. Collected by C. F. Leithold.

*Psoralea Californica* Wats. seems hardly distinct from *P. esculentus*. It is common enough about elevations of 3-5000 feet in Lake County, and has been collected by the writer on Mt. Diablo, by S. B. Parish on the San Bernardino Mountains, by Miss Eastwood on the peaks west of Alcalde, and near Kernville by Mr. Brandegee.

*Astragalus Purshii* Dougl. Snow Mountain; Yolo Bolo.

*Prunus emarginata* Walp. Abundant, forming tangled thickets, in the summit valley of Snow Mountain.

*Rubus leucodermis* Dougl. Snow Mountain. Common.

*Purshia tridentata* DC. Slopes of Snow Mountain at 5000 to 6000 feet.

*Cercocarpus ledifolius* Nutt. Covering a spur of Snow Mountain, not far from the Coast Survey monument. The gnarled trunks twelve to eighteen inches in thickness.

*Potentilla gracilis* Dougl. Snow Mountain. Common in high meadows.

*Horkelia tridentata* Torr. Snow Mountain.

*Ivesia Gordoni* T. & G. Near the monument, Snow Mountain.

*Saxifraga pellata* Torr. Snow Mountain, streams of the lower part.

*Ribes Lobbii* Gray. Snow Mountain. Equally abundant with *R. Menziesii* Pursh. The fruit is so strongly glandular as to be scarcely fit for any use.

*Sedum obtusatum* Gray. Snow Mountain.

*Gayophytum ramosissimum* T. & G. Snow Mountain. Common.

*Gayophytum pumilum* Watson. Snow Mountain and common about Lake County.

*Megarrhiza muricata* Wats. Common in Lake County and in Colusa County not far from Leesville. The fruit usually 8-seeded.

*Galium Bolanderi* Gray. Snow Mountain; Yolo Bolo.

*Galium multiflorum* Kell. In crevices of rocks, Snow Mountain; Yolo Bolo.

*Eupatorium occidentale* Hook. Streams about the base of Snow Mountain.

*Brickellia Greenei* Gray. Snow Mountain; Yolo Bolo. Flowering in August and September.

*Aplopappus apargioides* Gray. Snow Mountain.

*Aplopappus Greenei* Gray. Snow Mountain; Yolo Bolo. August.

*Bigelovia graveolens* Gray. Shasta Plains; Sissons; Yolo Bolo; Snow Mountain; Bartlett Mountain; Mt. Hanna. Flowering at the end of August.

*Aster Shastensis* Gray. Snow Mountain; Yolo Bolo.

*Aster adscendens* Lindl. Snow Mountain.

*Antennaria luzuloides* var. *argentea* Gray. Snow Mountain; Elk Mountain.

*Antennaria Geyeri* Gray. Yolo Bolo.

*Hemizonella Durandi* Gray. Bartlett Mountain; Snow Mountain.

*Chaenactis Douglasii* H. & A. Snow Mountain.

*Arnica foliosa* Nutt. Very abundant along streams and covering a long slope near the monument on Snow Mountain.

*Raillardella Muirii* Gray, var. Abundant on rocky slopes near the monument on Snow Mountain. It was just coming well into bloom on the twenty-fifth of August.

*Crepis intermedia* Gray. Snow Mountain.

*Crepis occidentalis* var. *crinita* Gray. Snow Mountain.

*Crepis occidentalis* var. *Nevadensis* Kell. Cobb Mountain, C. F. Leithold.

*Arctostaphylos Nevadensis* Gray. Snow Mountain.

*Pyrola picta* Smith. Common on Snow Mountain.

*Pyrola rotundifolia* L. Cobb Mountain, Lake County, C. F. Leithold.

*Pyrola aphylla* Smith. Often collected on Tamalpais, and frequent through Lake County, northward.

*Pterospora andromedea* Nutt. Snow Mountain.

*Cycladenia humilis* Benth. Common and abundant on the higher slopes of Snow Mountain.

*Schizonotus purpurascens* Gray. This species is widespread and abundant on Snow Mountain, flowering in June and ripening its fruit in September.

*Frasera nitida* Benth. Cobb Mountain, C. F. Leithold; Mt. Hanna; Snow Mountain.

*Frasera speciosa* Dougl. Yolo Bolo.

*Phlox Douglasii*? Yolo Bolo. Past flower and fruit.

*Collomia tenella* Gray. Snow Mountain. Common.

*Gilia pungens* Benth. Crevices of rocks, Snow Mountain.

*Gilia aggregata* Spreng. Snow Mountain.

*Gilia Harknessii* Curran. Common about the borders of meadows, Snow Mountain.

*Gilia capillaris* Kell. Allen's Springs; Hot Springs, Eel River and very abundant all about Snow Mountain; Mt. Sanhedrim, J. W. Blankinship; Hy-Am-Pum, W. W. Price; taller and less diffuse at the lower elevations.

*Collinsia Torreyi* Gray. Snow Mountain. Common.

*Pentstemon Menziesii* Hook. Snow Mountain; Yolo Bolo; Cobb Mountain; Mt. St. Helena.

*Mimulus rubellus* Gray. Snow Mountain. Common.

*Mimulus primuloides* Benth. Wet meadows, Snow Mountain.

*Castilleja linariaefolia* Benth. Snow Mountain; Yolo Bolo.

*Castilleja miniata* Dougl. Pubescent form. Cobb Mountain, C. F. Leithold; Snow Mountain; Yolo Bolo.

*Cordylanthus Pringlei* Gray. Lower slopes of Snow Mountain. Flowering in August and September.

*Pedicularis semibarbata* Gray. Bartlett Mountain; Snow Mountain.

*Monardella odoratissima* Benth. Snow Mountain.

*Lophanthus urticifolius* Benth. Snow Mountain. Growing in thickets of *Ceanothus*, *Ribes*, etc., the purplish heads surmounting them.

*Polygonum Bistorta* L. Meadows and banks of streamlets, Snow Mountain.

*Polygonum Davisæ* Brewer. High rocky peaks, Snow Mountain.

*Eriogonum umbellatum* Torr. High rocky ridges, Snow Mountain; Yolo Bolo.

*Eriogonum compositum* Dougl. Snow Mountain; Yolo Bolo.

*Eriogonum Lobbii* T. & G. High rocky ridges near the monument, Snow Mountain. Flowers forming larger heads and of deeper rose-color than those seen in the Sierra Nevada.

*Eriogonum ovalifolium* Nutt. Abundant and forming dense tufts often a foot in diameter, the snowy mass of small leaves surmounted by short peduncles, bearing heads of whitish flowers which become at length rose-colored. Snow Mountain.

*Eriogonum spergulinum* Gray. Snow Mountain. Common about the borders of meadows.

*Eriogonum hirtiflorum* Gray. Common in Lake County. Dwarf at high elevations, but about Hough's Springs and on the lower slopes of Snow Mountain reaching so great a size that a single individual would fill several sheets of collecting paper.

*Quercus chrysolepis* Liebm. on Snow Mountain reaches an elevation of about 4000 feet, above that level dwarfing rapidly into its subalpine form, var. *vaccinifolia*. The ascent of the mountain is so abrupt that the phases of transition can be readily followed.

*Taxus brevifolia* Nutt. Deep cañons of Elk Mountain and on Snow Mountain.

*Abies concolor* Lindl. Snow Mountain, from 4500' to 6000 feet, also on Cobb Mountain, where it was collected by Mr. C. F. Leithold.

*Abies nobilis* Lindl. The most abundant tree of Snow Mountain above the altitude of 6000 feet.

*Pinus Sabiniana* Dougl. reaches about 3800 feet on Snow Mountain.

*Pinus ponderosa* var. *Jeffreyi* Gray is found on Snow Mountain from 5000 feet upward.

*Pinus Balfouriana* Jeffrey. Yolo Bolo.

*Pinus Lambertiana* Dougl. was found on Snow Mountain at greater elevation than any other pine, but in the higher altitudes the trees were dwarfed and distorted.

*Veratrum Californicum* Durand was abundant in the meadows of Snow Mountain.

*Smilax Californica* Gray. Yolo Bolo.

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## RANDOM BIRD-NOTES FROM MERCED BIG TREES AND YOSEMITE VALLEY.

BY W. OTTO EMERSON.

I found on arriving at the South Grove of Merced Big Trees some interesting birds peculiar to the higher altitude of the Sierra in summer. I spent June 17 and 18, 1893, in that section of the Merced Grove. I found it a slight hollow or flat of some four or five acres in extent where are eighteen or twenty trees of *Sequoia gigantea* scattered through the forest of sugar pines, yellow pines, cedars and firs.

The work of the pileated woodpecker (*Ceophlæus pileatus*) can be seen here and there spotted over the thick bark of the Sequoia. Many of the holes were six to eight inches across and ranging all the way from ten to thirty feet from the ground. I saw only one of these large woodpeckers as it flew through the trees.

I saw three of the white-headed woodpecker (*Xenopicus albolarvatus*). In the dead top of a pine stump some fourteen feet from the ground was a nest of a pair of these birds. After rapping on the stump I could hear the young squeakers calling for their parents. I watched the old birds for an hour or more collecting insects from the bark of the different evergreens to feed the ever hungry young ones. They always began at the lower part of the tree and gradually worked upward, zig-zagging around the tree to the top, then flying downward to the base of another tree. It would take at least half an hour before seeming to have enough insects to carry to the young. I supposed the birds to be gathering ants and larvæ of bark insects. It was the delight of one of this pair of woodpeckers to fly to a certain fir tree and have a pair of Louisiana tanagers (*Piranga ludoviciana*) chase it around the tree. I have no doubt but that the tanagers had a nest in the tree. While camped in the grove I saw five of these tanagers.

I noticed only two of the red-breasted sapsucker (*Sphyrapicus ruber*). One I watched every morning from my tent fly to the top of a tall burnt tree and rap its roll-call as a kind of warning may be to the flying insects. It would then sail out like a flycatcher, catch an insect, and return to the burnt tree-top. Its movements were very graceful and regular. As it dipped or circled around for this or that insect the sunlight catching on the red breast lit it up like a patch of flame.

The Californian woodpecker (*Melanerpes formicivorus bairdi*) was not uncommon. Harris' woodpecker (*Dryobates villosus harrissii*) was the only other species of Picidæ noted in the grove besides the red-shafted flicker (*Colaptes cafer*).

The blue-fronted jay (*Cyanocitta stelleri frontalis*) was twice seen, but was very shy and quiet, no doubt nesting.

The California purple finch (*Carpodacus purpureus californicus*) was observed several times, but had not paired off.

Juncos (*Junco hyemalis thurberi*) were in pairs, but not common.

One thick-billed sparrow (*Passerella iliaca megarhyncha*) was noted, seeming to have only arrived, as I found them common later above the Yosemite Valley.

Two spurred towhees (*Pipilo maculatus megalonyx*) were seen.

That most beautiful swallow, the violet-green, (*Tachycineta thalassina*) was seen to pass one morning on its way to the oak flats.

Audubon's warbler (*Dendroica auduboni*) was seen on one occasion passing hurriedly through the trees.

A male black-throated gray warbler was seen feeding amongst low bushes early one morning.

I saw four of the beautiful hermit warblers (*Dendroica occidentalis*); all were feeding in low bushes along the mountain streams.

The California creeper (*Certhia familiaris occidentalis*) was observed several times running up and down first one tree and then another. All were busy hunting food for young.

The slender-billed nuthatch (*Sitta carolinensis aculeata*) was seen but once.

I saw one Townsend's solitaire (*Myadestes townsendii*) the day we arrived in camp at the grove. I collected a specimen at Haywards some ten or twelve years ago, the only one I have heard of being taken so near the Coast.

A ruby-crowned wren (*Regulus calendula*) was observed feeding in a fir tree.

The notes of small thrushes (*Turdus*) were heard several times, but the birds being so shy, I could not get a glimpse of them.

The following birds were observed from June 20th to 25th in the Yosemite Valley. It is a garden spot on a grand scale for bird life. I think that the valley is one of the best spots in California to spend a season, collecting. Here are found trees and shrubs of the white, black and chestnut oaks, yellow, silver and sugar pines, red cedar, Douglas fir, willows, cottonwood and alders, manzanita, chemise, chaparral, wax-berry, deer-brush, wild rose, California azalea, wild coffee, dog-wood, mountain mahogany, wild cherry, currant and gooseberry.

Killdeer (*Ægialitis vocifera*) were seen along the Merced River banks.

The day we entered the valley, June 19th, a bevy of downy

young of the plumed partridge (*Oreortyx pictus plumiferus*) with the old ones ran across the road and scattered among the leaves. Every morning in my walks before sunrise I would see the partridges dusting themselves in the road. I noticed none of the California partridge while in the valley. A young lady of our party caught two downy young of the sooty grouse (*Dendragapus obscurus fuliginosus*) on the trail going to Nevada Falls June 21st. The old birds would not respond to the peeping of the young and venture from the bushes and the young were allowed to go.

Mourning dove (*Zenaidura macroura*) was seen but once.

A Cooper's hawk (*Accipiter cooperi*) was seen sailing among the firs and pines on Glacier top, at an altitude of 3300 feet.

A golden eagle (*Aquila chrysaetos*) appeared once high above the Yosemite Falls to let us know that Eagle Point above our camp was named for him.

Belted kingfishers (*Ceryle alcyon*) were observed along the river.

Four species of woodpeckers were seen in the valley, Harris', white-headed, Californian and red-shafted flicker.

The peculiar, lonely notes of a California poor-will (*Phalacroptilus nuttalli californicus*) could be heard nights high up on the cliffs above the valley.

The black swift (*Cypseloides niger*) is very common high up in all the cliffs, particularly the face of Glacier Point. I have sat on the rocks of the trail leading up to the point and had them sail close over my head and could see them below me moving back and forth about the face of the cliff.

Associated with the black swifts were several of the white-throated (*Aëronautes melanoleucus*.)

The only humming-bird observed in the valley was the calliope (*Trochilus calliope*). One came within eighteen inches of my feet to the flowers of a milk-weed. I often noticed them about the young fir tops where they may build their nests. I have a male specimen which was shot in my orchard at Haywards from a flowering peach tree, March, 1880.

Ash-throated flycatchers (*Myiarchus cinerascens*) were several times seen in the oak trees near our camp and along the fences in the meadows.



Western flycatcher (*Empidonax difficilis*) was observed but once along the bushy banks of the Merced River.

I heard the notes of the olive-sided flycatcher (*Contopus borealis*) on several occasions in the high tree tops along the high trails of the valley.

The western wood pewee (*Contopus richardsonii*) was not uncommon, usually in pairs. A nest was being built in an oak near my tent.

Blue fronted jays were tolerably common in the deep forests and cañons, preferring the cedars and firs.

Clarke's nutcracker (*Picicorvus columbianus*) was seen on two occasions, once on Sentinel Dome, 8122 feet altitude.

A single female blackbird (*Agelaius*) was twice seen flying across the meadow by the river, and a western meadow-lark (*Sturnella magna neglecta*) was noticed in the same locality.

Bullock's orioles (*Icterus bullocki*) were seen in the oaks near camp.

Brewer's blackbird (*Scolecophagus cyanocephalus*) was nesting in trees near the lower hotel.

In the forenoon of June 25th, while camping near the old saw mills not far from Mr. Hutchings' cabin, a pair of evening grosbeaks (*Coccothraustes vespertinus montanus*) came to our table, placed beside a white oak, to pick up crumbs for their young. They were not afraid of anyone in camp.

The purple finches also came to camp every day for food.

Western chipping sparrows (*Spizella socialis arizonæ*) were noted several times about camp. I think they had young in an old apple orchard near by.

Juncos were met with only in the deep forests of pines, cedars, and firs, and were not paired as far as I could judge.

A variety of song sparrow was not fully identified. Mr. Shelley Denton collected specimens there in 1881, which I am sure were *Melospiza fasciata montana*.

Lincoln's Sparrow (*Melospiza lincolni*) was seen in the meadow.

Thick-billed sparrows were seen several times. I sat by the trail to Glacier Point where it passes through a stretch of manzanita to hear the song of this species. It is a loud, clear, whistling

note, much like the notes of the purple finch. After singing several notes they would dive into the brush like the wren-tit.

Spurred towhees were not uncommon all through the valley, and the green-tailed towhee (*Pipilo chlorurus*) were seen about bushes near camp. Mr. Denton collected a number of them in his visit here in 1881.

The black-headed grosbeak (*Habia melanocephala*) was very common all through the valley. They came into camp in pairs and helped themselves from the table, not seeming afraid of anyone; no doubt had young near by. The males were on good terms with each other, eating from the same piece. They repaid us by singing from the tree tops at first light of day and last at night.

Lazuli bunting (*Passerina amæna*) was not common in the valley and only seen about orchards. Louisiana tanagers were common all through the thickest forests, preferring the tall firs. I heard no notes from them and they did not appear to have paired off.

The notes of the western purple martin (*Progne subis hesperia*) were heard in some old oaks near the Stoneman House, like the old farm-place of my eastern home. At two camping-places in the foothills I noticed young martins.

Violet-green swallows were seen in company with the two species of swifts high up on the Glacier Point trail. They no doubt nest in the cliffs as very few trees were suitable on the wall ledges.

The only vireo observed in the valley was the warbling (*Vireo gilvus*).

Lutescent warblers (*Helminthophila celata lutescens*) were not common and only twice observed along the river banks in thick brush.

Andubon's hermit and yellow warblers were seen but once during my short stay.

A pair of Macgillivray's warblers (*Geothlypis macgillivrayi*) were seen in thick azaleas near the river and acted as though they had a nest near the spot.

American dipper (*Cinclus mexicanus*). The first bird to greet me on getting into the valley was this water spirit, at the foot of

Cascade Falls where it comes leaping and rolling off the granite boulders to the river, the ideal home of the dipper.

The California creeper was seen on two occasions on cedar trees.

Slender-billed nuthatches were seen in white oaks once, but no individuals of *Sitta canadensis*.

The mountain chickadee (*Parus gambeli*) was seen on one occasion while passing through a mass of firs at summit of Glacier Point. The surrounding conditions were such that I expected to find it a common bird.

The whistling notes of a pallid wren-tit (*Chamaea fasciata henshawi*) were heard in a manzanita thicket half way up to Glacier Point.

A ruby-crowned wren was seen in a young fir tree near our camp at Bridal Veil Fall.

Townsend's solitaire was twice seen and a specimen taken at Diamond Cascades below the Vernal Falls.

The jewel of all the high Sierra singers is the western robin (*Merula migratoria propinqua*). It perches at the top of a pine or fir and sings till the setting sun is down, breaking forth now and then with a few notes till night begins. At first break of morning light, about three o'clock, his song is in greatest perfection; after greeting the day he is then quiet excepting a short low bar of love to his nesting mate. Full-grown young with spotted plumage were about our camp all the time.

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## BOTANICAL NOMENCLATURE.

BY KATHARINE BRANDEGEE.

It must be confessed that the present state of nomenclature is hardly an encouragement to those attempting to reform it. Almost every author of a systematic treatise has a system of his own, differing more or less from that of his neighbor, and in too many cases his meaning can only be made out by the average botanist through the quoted "synonymy." This state of things not only furnishes the "biological" botanist with his keenest weapons against systematic work but lessens to a marked degree

the interest felt in the science by the large body of botanists, who not being in command of extensive libraries find themselves unable to judge between the conflicting claims of the various new names, with which those familiar to them are to be supplanted.

The rigid law of priority, judging by what its attempted enforcement has produced, is not competent to give us a stable nomenclature. There are too many cases which under such a rule must always remain in doubt, and it is further complicated by questions of sufficiency of publication, and the right to amend names which open vistas of perpetual argument. It must be apparent too that the claim of strict justice which is supposed to underlie the law of priority is a delusion. It puts the work of the most ignorant and incompetent on a level with that of the greatest scientist, offering a direct premium for hasty and inconsiderate work, and yet no permanent advantage can accrue to the vain glory of anyone, for it is only a question of time and settled nomenclature when author-citation will be discontinued in systematic, as it now is in popular and semi-scientific work.

It would seem that there should be some limit to the raking up of obscure and forgotten species and genera, especially as they were in the great majority of cases neglected for good reason, and have in many instances become recognizable only by the advance of knowledge or by a process of exclusion. A law of limitation has been found necessary in the property affairs of mankind, and such a law with a period of—say fifty years—might give us relief from that class of “scientists” whose researches into the mysteries of nature consist in trying to find out what our predecessors knew, instead of doing their little best to add to the world’s knowledge.

A tendency to legislate for one’s neighbors is usually found in indirect ratio to fitness for such an office. No code of laws yet exists which is able to provide for all occasions, and the more minutely rules are drawn, the greater is the list of exceptions. The citing of publications, for instance, may safely be left to the example of those who remember in their works, that the saving of labor to others is the object of citation, and the question of the

initial letters of species will settle itself in time into a matter of convenience, there being no real rule of grammar involved—the Romans as every one knows had only one kind of letters—all capitals.

Rules relating to the formation of systematic names had perhaps better be only recommendatory. The aspect of the purist in the language of science is one of the most ridiculous things the world has encountered. The Latin of modern science would at its best be a foreign language to Cicero, and the attempt to exclude names not formed according to the best models is especially characteristic of those who, having rather late in life acquired a "little Latin and less Greek," are painfully anxious to advertise the fact.

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#### JOHN LORA CURTIS.

John Lora Curtis, the young California araneologist, who died in Oakland on February 19, 1893, was a life-long invalid. He was confined to a wheel-chair for thirteen years, more than half of his short life. He was so weak that even a book was too large a burden for his hands. Yet he was a better student and lover of nature than many stronger men. His education was necessarily desultory. He began his study of spiders in his sixteenth year, and did his collecting of specimens mostly at second hand, through friends and correspondents. In this way he collected and preserved more than two hundred species of spiders, almost altogether from California. He estimated that, at a reasonably low figure, fifty of these were new to science.

Lack of funds kept his library small, and he had not been able to secure such works on American spiders as Keyserling's, therefore he was very diffident about offering to publish for new what might prove to be species already described. Had his life been spared only a few years longer he surely would have added new forms to the list of described spiders of California. As it is, it remains the duty of some arachnologist to work over the specimens left by him with their accompanying notes.

Just a few days before his death he had the pleasure of reading the proof of his first (and last) published article: *A New*

*Jumping Spider*, in *Zoe*, vol. iii, p. 332. He had previously prepared an article on a species of *Theridion*, of about fifteen or twenty ordinary octavo pages, illustrated with over fifty figures, mostly colored, and finished with great care. This contains, beside the description of the little spider, its life history thro' two generations, each represented by many individuals, noting at least six fairly distinct varieties. The publication of this article has been delayed by the difficulty in reproducing the colored plates.

Rev. Henry C. McCook, the distinguished araneologist of Philadelphia, in writing of Mr. Curtis says: "A little while before I had prepared material for a new species of spider which I had dedicated to him, attaching to it his name. The drawings of this are done, and the engraving of *Pachygnatha Curtisi* is already upon the plate of the lithographer."

His interest in spiders was united to a lively interest in other branches of natural history and social progress. His aim was to prepare a descriptive list of the spiders of California. When he foresaw his early death he hoped some stronger hand would continue and finish the work.

J. D. L.

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A NEW STATION FOR ASPLENIUM SEPTENTRIONALE. Mr. Brandegee sends specimens from San Pedro Martir, a high mountain nearly east of San Quintin, in Baja California. This is five or six hundred miles west of the nearest previously recorded station, which is, I think a mountain in New Mexico, called Ben Moore, where Dr. J. M. Bigelow detected it in 1851. Mr. Charles Wright collected it probably at the same place a little later. Next, Hall & Harbour found it in Colorado, and Mr. Brandegee obtained it later in the Grand Cañon of the Arkansas.

In the Old World its range is from Great Britain to the Himalaya Mountains. It is strange it has never been found in the eastern part of North America.

D. C. EATON.

## RECENT LITERATURE.

*A Jumping Mouse (Zapus insignis Miller), new to the United States.* By GERRIT S. MILLER, JR. Proc. Biol. Soc. Wash., viii, April 22, 1893, 1-8. This species described by Mr. Miller in Am. Nat. xxv, August, 1891, 472, from New Brunswick, has since been collected in New Hampshire and New York.

*Description of a New White-footed Mouse from the Eastern United States.* By GERRIT S. MILLER, JR. Proc. Biol. Soc. Wash., viii, June 20, 1893, 55-69. *Sitomys americanus canadensis*.

*List of Mammals Collected by Mr. Charles P. Rowley, in the San Juan Region of Colorado, New Mexico, and Utah, with Descriptions of New Species.* By J. A. ALLEN. Bull. Am. Mus. Nat. Hist., v, April 28, 1893, 69-84. Thirty-four species are enumerated with annotations and critical notes. The following are described as new: *Zapus princeps* from Florida, La Plata County, Colorado; *Arvicola (Mynomes) aztecus* from Aztec, New Mexico; *Sitomys auripectus* from Bluff City, Utah; *Sitomys rowleyi* from Nolan's Ranch, Utah; *Reithrodontomys aztecus* from La Plata, New Mexico.

*Introduction to a Monograph of the North American Bats. Notes on the Genera of Vespertilionidæ.* By HARRISON ALLEN, M. D. Proc. U. S. Nat. Mus., xvi, pages 1-31.

*Rediscovery of the Mexican Kangaroo Rat, Dipodomys phillipsi Gray.* By C. HART MERRIAM, M. D. With Field Notes by E. W. NELSON. Proc. Biol. Soc. Wash., viii, July 18, 1893, 83-96. A series of 67 specimens from the Valley of Mexico, after the species had been known but from a single specimen for fifty-two years.

*Systematic and Alphabetic Index to New Species of North American Phanerogams and Pteridophytes, Published in 1892.* By JOSEPHINE A. CLARK.

This index is one of the most useful publications of the National Herbarium. It is, however, marred by a very serious fault. Instead of being an index of new species, it is in very large part an index of changes of nomenclature, and there are

furnished no means of determining to which of these classes any given name belongs. For instance, Miss Vail is credited with a list of species of *Meibomia*, only one of which was described by her, and none at the place cited; and McMillan is credited with six species of *Pleurolobus*. Only the comparatively small number of botanists who concern themselves with changes in nomenclature are likely to remember that these are but familiar species of *Desmodium*, many of them described by Linnæus. Professor Greene is credited with fifteen new species of *Blepharipappus*, which are only renamed *Layias*, and twenty-four species of *Linanthus*, all but one of them long-described and well-known *Gilias*. In like case are all the new species of *Platystemon*, *Bicuculla*, *Caprifolium*, *Jacksonia*, *Lesquerella*, *Nasturtium*, *Stellularia*, *Hesperalcea*, *Kuhnistera*, *Kunzia*, *Lutkea*, *Therofon*, *Stellaria*, *Arracacia*, *Myrrhis*, *Symphoricarpus*, *Caprifolium*, *Ereminula*, *Lappula*, *Kœllia*, *Tullia*, *Salvia*, *Ramona*, *Mirabilis*, *Neckeria*, *Razoumofskya*, *Manihot*, *Scoria*, *Ostrya*, *Leptorchis*, *Corallorhiza*, *Gyrostachys*, etc., etc. In a number of instances the same species—even those considered the same by their author—is listed twice, as in the case of *Fritillaria coccinea* & *Fritillaria recurva coccinea*, *Callichroa nutans* & *Blepharipappus nutans*, *Plagiobothrys Californicus* & *P. campestris*. These serious errors are so easily remediable by the use of different type or by double citation that we hope to see the next list free from them.

*Additions to the Phanogamic Flora of Mexico.* By B. L. ROBINSON and H. E. SEATON, being No. 3 of the New Series of Contributions from the Gray Herbarium of Harvard University. In it twenty-nine new species and several varieties are described.

In the *Torrey Club Bulletin* for July, Dr. Britton has been doing useful work in looking up the authenticity of some of Rafinesque's genera recently attempted to be revived. *Pseva*, which Dr. Kuntze has taken as the older name of *Chimaphila*, in which action he was precipitately followed by Professor Greene, is shown to have no foundation. It rests upon Rafinesque's statement, published in the *Journal de Physique*, 1819, that "*Chimaphila* Pursh is antedated by *Pseva*, Raf. Med.



Rep. 1809." Dr. Britton says: "I wish to record here that I have recently gone over these papers line by line, and can find no allusion to *Pseva* in any of them, nor have I met with the name in any of Rafinesque's writings except at the place where he claims it as noted above." The attempt to resurrect an earlier name for *Polanisia* is disposed of as follows: "*Jacksonia*, Raf. Med. Rep. (II) v, 352 (1808). Professor Greene has argued in *Pittonia* ii, 174 and 274 that this name should replace *Polanisia* Raf. Journ. Phys. lxxxix, 98 (1819) but I cannot see that his position is tenable. *Jacksonia* is published at the place above cited as follows:

*Jacksonia* (trifoliata)=*Cleome dodecandra* L. Now *Cleome dodecandra*, L. Sp. Pl. 672 is a well-known Indian species. Rafinesque evidently followed Michaux in supposing that it was North American, and *Cleome dodecandra* Mich. Fl. Bor. Amer. ii, 32, 1803, is indubitably the same as *Polanisia graveolens* Raf. Amer. Journ. Sci. i, 379 (1819) and not at all the plant of Linnæus. In matters of nomenclature we must be exact and so it seems to me that *Jacksonia* Raf. can only apply to the Asiatic, Linnæan, *Cleome dodecandra*. I do not find any allusion to *Jacksonia* in subsequent writings of Rafinesque, and presume that he discovered his error." In the meantime, however, Professor Greene has made haste to transfer\* the species of *Polanisia* to *Jacksonia* and under the head of "Corrections in Nomenclature" †to transfer the three dozen species of the Australian, Leguminous genus *Jacksonia* to another name.

*The Range of Amorphia fruticosa.* By JOHN M. HOLZINGER of the U. S. National Herbarium. Under this heading Mr. Holzinger prints in *Erythea* for June some notes on specimens belonging to the U. S. National Herbarium which show that the range of the species is considerably farther extended than had been supposed. In the course of his examinations he found that the three sheets of this group belonging to Professor Greene's herbarium, two of them labeled *A. Californica* Nutt. and one *A. hispidula* Greene, were in his opinion incorrectly named. Concerning them he wrote: "There seems to have existed a long

\* Pitt. ii, 174.

† *Erythea*, 114.

standing confusion of *Amorpha fruticosa* with *A. Californica* in the region of Arizona, New Mexico and Southern California that must have led Professor Greene to describe Nuttall's true *Amorpha Californica* as a new species, *A. hispidula*." Professor Greene seems to have become somewhat enraged, and in an appended note bristling with remarks concerning Mr. Holzinger's "dogmatism," "bald opinions," "entirely gratuitous suppositions," etc., gives the luckless botanist who has presumed to differ from him, a sound verbal spanking. Nevertheless Mr. Holzinger is entirely correct as everyone at all conversant with the flora of California knows, and Mr. Greene as entirely wrong. Indeed his descriptions of *A. Californica* and *A. hispidula* in Flora Franciscana convict him sufficiently. In the brief description there given he omits from the former, apparently intentionally, for as it appears in all descriptions he can hardly have been ignorant of it, Nuttall's significant phrase "petioles furnished with minute glandular scales." At the risk of being accused of "dogmatism" I venture to state that *A. fruticosa* enters Southern California where it has been collected not only by Dr. Palmer, but also by George W. Dunn who found it in the mountains near Julian something like forty miles north of the boundary. It grows also about the lower elevations of San Pedro Martir in Baja California, which is perhaps its southern limit. The range of *A. Californica* as at present known is from the southern border of Mendocino County along the Coast Range in various localities to San Pedro Martir, where it has recently been found on the summit plateau. In the Sierra Nevada foothills it appears to have been collected only at the Alabaster Cave not far from Auburn. The only habitat known for *A. hispidula* is the mind of Professor Greene.

*Fourth Annual Report of the Missouri Botanical Garden* contains, besides the usual Reports, etc., a list of plants collected by Albert S. Hitchcock in the Bahamas, Jamaica, and Grand Cayman, 132 pages, and four plates of the new species, *Pavonia Bahamensis* Hitchcock, *Anastrophia pauciflorescens* Wright, *Euphorbia Blodgettii* Engelm., and *Eragrostis Bahamensis* Hitchcock. The remainder of the volume is occupied by "Further Studies of Yuccas and their Pollination" by William Trelease.

Professor Trelease adopts, in accordance with Mr. Baker's views, the name, "*Hesperoyucca*" for *Yucca Whipplei*, which he separates as a generic type. The article is accompanied by many excellent plates.

*North American Sileneæ and Polycarpeæ.* By B. L. ROBINSON. Being the fifth of the new series of Contributions from the Gray Herbarium. This tentative revision is preliminary to treatment of the Caryophyllaceæ in the Synoptical Flora and its object is stated to be "chiefly to secure aid through criticisms, and to call attention to such species, especially in the genera *Silene* and *Lychnis* as are still imperfectly known, so that if possible more complete material of them may be secured before final revision." The author evidently doubts the validity of certain accepted species of *Silene* and his remarks upon the distortion of the flowers of the type of *Silene Lyalli* by a well-known fungus are very suggestive. One new species of *Lychnis*, *L. Tayloræ*, and two of *Silene*, *S. Watsoni* (changed from *Lychnis Californica*) and *S. scaposa* are proposed. *S. simulans* is reduced to *S. laciniata*, *S. incompta* to *S. Bridgesii*, *S. plicata* to *S. Thurberi*, *S. Shockleyi* to *S. montana*, *S. Macounii* & *S. monantha* to varieties of *S. Douglasii*; *S. purpurea* is admitted "but not seen by the author." With the treatment of *Lœflingia* we do not agree and hope that fuller material will convince the author that there are not three American species. The appearance of a revision of the remaining genera is awaited with much interest, and from Dr. Robinson's opportunities and well-known conscientiousness in research it cannot fail to be valuable.

*Contributions from the Herbarium of Columbia College, No. 35. An Enumeration of the Plants collected by Dr. Thomas Morong in Paraguay, 1888-1890.* By THOMAS MORONG and N. L. BRITTON, with the assistance of MISS ANNA MURRAY VAIL. Reprinted from Annals of the New York Academy of Sciences vol. vii. The paper is of much consequence to the flora of South America. It has the interest which always attaches to botanical papers where the author has been at once collector and writer.

*Forest Influences*—Bulletin No. 7 of the Forestry Division, U.

S. Department of Agriculture. This is a series of papers by B. E. Fernow, M. W. Harrington, Cleveland Abbe, and G. E. Curtiss, on a subject of great economic importance.

*Grasses of the Pacific Slope, Part ii*, being Bulletin No. 13 of the Department of Agriculture, Division of Botany. This part, issued after the death of Dr. Vasey, contains fifty plates with descriptions, titles, and index and completes the volume. It is a welcome addition to the literature of the Grasses.

*Erythea* for July contains some new species of Californian Fungi by J. B. Ellis and B. M. Everhart; an account of A New Station for *Notholena tenera* by S. B. Parish; Remarks on the Genoa Congress by Dr. Otto Kunze, and under the title "Novitates Occidentales" the usual new species, of the customary value, by Professor Greene.

*A Dictionary of Botanical Terms*: A. A. CROZIER. Henry Holt & Co., New York 1892.

The progress in the study of natural sciences during the later years has very considerably extended our points of view in many directions. In botany, for instance, investigations in morphology, anatomy and physiology have been carried out to such an extent as to make the introduction of new terms necessary, while many of the terms formerly used have been dropped. This introduction of new terms and change of older ones has caused considerable trouble to both authors and students.

It is, therefore, very natural that a terminology thoroughly brought up to date would be welcomed all the world over, since a work of that kind would be both an assistance and guide to our reading and would enforce uniformity in using the terms as generally adopted. A work of that kind, it seems to us, should only be the product of careful literary research made by several specialists in their respective lines, in order to give a reliable result. We, therefore, felt very much surprised to see a book of this scope written by a single author. A mere look in the book soon convinced us that a very large number of terms had been compiled, and so far the book is of some use.

But since this book will undoubtedly enter the libraries of our

universities and colleges, we feel the more at liberty to discuss in how far it is to be recommended as a suitable dictionary for the study of botany.

It appears, only too clearly upon careful examination, that the author of the present work has not possessed full knowledge of any of the many botanical lines which were supposed to be represented by modern or old terms in this book.

The literary part of the work has not been done carefully, and the definitions of the various terms are very poor, and absolutely incorrect in many cases. What we hoped to find was not only an explanation of the words themselves, when taken from foreign languages, their derivation for instance, but also their true signification in botany, as they have been or are still applied by different authors. But in this respect the book does not give much information, indeed it seems as if the whole subject has been treated more like a mere compilation without criticism rather than representing the result of literary research and original investigation.

It is very unsafe to quote terms from a single article without trying to find out by original and confirmatory investigations what it really means. Instead of finding a uniformity in terms, as applied for instance to a series of homologous organs, we find often great confusion. In many cases the terms themselves are not correctly defined, besides a number of quite common ones are entirely overlooked.

By considering the morphological terms it is striking to see, that the most essential points are often not given, and it seems necessary to give a few citations:

"Cotyledon" is said to be "the first leaf or leaves of a plant;" we wonder if this also applies to *Cryptogames*?

"Nut" is defined as being "the fruit of certain trees and shrubs, consisting of a hard shell enclosing the seed." The principal characteristic, that a nut is indehiscent, is omitted.

"Nutlet" is "a small nut, or nutlike seed or fruit as many achenia." We doubt whether it has ever been applied to seeds.

"Paraphyses" are defined as "sterile filaments," while a filament is defined as "the stalk of an anther."

"Utriculus" is referred to "utricle" as being "a fruit with

inflated, membranous pericarp;" the very well-known utriculus of *Carex* is not mentioned and is not to be compared with such a kind of utricle.

About "drupe" is only said that "it occurs in peach, almond, and cherry, being characterized by having a bony endocarp;" nothing is said about the fleshy exocarp.

"Nectary" is, according to this dictionary, only "the part of a flower which secretes nectar." The common extra floral nectaries are silently passed by, and this is the more curious when we see under "gland," "also applied to certain wart-like swellings which are not secretory, [sic] as the abortive teeth at the base of the leaf of peach and cherry"! These glands are certainly secretory, however. "Secretory" is not defined.

"Scape" is defined as "a peduncle rising from the ground, as in *Sanguinaria*, i. e., a stalk from the root." The author has probably never seen the large rootstock of this common plant.

"Palet" of the grasses is defined as "the inner bract or chaff." This organ is, nevertheless, wanting in several genera; then the flowering glume would be the same as the palet, a terminology which is untenable. The singular position of this organ, the palet, with its back towards the mother-axis, seems entirely unknown to the author.

If we turn to the anatomical and physiological terms, we find these still more defective, and it is often utterly impossible to draw any correct conclusion from the definitions of the various tissues, when compared with each other. "Cuticle" is said to be "the outer cell-wall of the epidermis;" "Leptome," which is credited to Potonié, is attributed to "vascular Cryptogames only," and "Hadrome," also credited to Potonié, and defined as "the phloëm-like portion of fibro-vascular bundles in vascular Cryptogames." These two terms, leptome and hadrome, would then be identical, while in reality hadrome is used instead of the term xylem. Under "Phloëm" we are told that "the inner bark is derived from the phloëm and the wood from the xylem." Haberlandt was the first to introduce these terms, not Potonié. The author ought to have studied Haberlandt's *Physiologische Pflanzen-anatomie*—he would then have been spared much trouble, besides would have been able to define these terms correctly.

In the definitions of Mestome, Stereome, Pericambium, and Endodermis, so plainly described by Schwendener, De Bary and other authors, it is surprising to find such confusion as occurs in this book. Mestome-sheath and Parenchyma-sheath are not defined at all, although the preface promises us very many terms from German botanists. Cells as ducts or reservoirs are represented only by "Laticiferous-vessels, *i. e.*, anastomosing tubes." De Bary's comparative anatomy would have been a great help to the author, and would have shown him that far from all of these are anastomosing. Reservoir is not defined, not even the common tannin reservoirs.

When these common terms are so badly treated, what can be expected in regard to the more complicated ones?

We merely need to look for the definition of "Chlamydo-spore" about which we learn that "they are formed asexually in Mucorini by free-cell formation." The words "transpiration" and "respiration" are so defined as to render it evident that the author is entirely ignorant of even elementary physiology.

In regard to recent cytological terms the book shows so many misinterpretations and omissions that it is difficult to see which authors, if any, have been consulted.

And when finally we call attention to some of the most elementary terms as "aqueous" defined as "nearly colorless, see hyaline," and "Eu" used as abbreviation and indicating, "when used after a species, that this is, certainly, a well-defined species, not a variety"! (while as used by Gray it indicates that the species occurs in Europe also,) we have probably given sufficient data to enable the reader to estimate the value of this book as "a guide to teachers and students"!

Considering this publication as it stands, it is hardly to be believed that the botanists, whose names appear in the preface, could really have given any critical thought either to the manuscript or to the proof of this book; if so explanations are in order.

There is, on the other hand, a work to which the author does not refer, although many of the definitions show an unmistakable resemblance to the corresponding ones in it. The Century Dictionary seems to have been used very freely, and it is, there-

fore, very natural that mistakes and misinterpretations should occur frequently. The botanical part of the Century Dictionary is largely a compilation of words and definitions without due criticism.

In reference to the reviews of this book which have appeared in the Botanical Gazette and in the Bulletin of the Torrey Botanical Club, one of two conclusions appears inevitable. Either the writers are themselves ignorant of modern botany, or they have followed the common and reprehensible practice of reviewing a book without having read it. The latter is the probable and more charitable conclusion.

In contrast to these complimentary reviews of the book in question, we can only say it would have been much more beneficial to the study of botany in this country if the book had never been printed.

THEO. HOLM.

#### PROCEEDINGS OF SOCIETIES.

CALIFORNIA ACADEMY OF SCIENCES. *May 1, 1893.* President Harkness in the chair.

Donations to the museum were reported from S. J. Holmes and W. L. Watts.

The Librarian reported 236 additions to the library.

Dr. George H. Horn, the well-known entomologist, was introduced by the President.

Walter E. Bryant read a paper on the "Variations of the Bill of the California Jay."

William L. Watts read a paper entitled "Notes on Quick-silver Deposits in California."

*June 5, 1893.* President Harkness in the chair.

Donations to the museum were reported from W. W. Price, Mrs. R. M. Austin, W. L. Watts, Gustav Eisen, Mrs. Geo. Buttner, Mrs. C. A. Boland, Charles Fuchs, Frank E. Harris, F. W. Gill.

The Librarian reported 352 additions to the library.

Dr. Gustav Eisen read a paper on "Recent Investigations on the Pollination of the Fig."



Walter E. Bryant read a paper on "Some Cases of Albinoism in California Mammals," with exhibition of specimens.

CALIFORNIA BOTANICAL CLUB. *May 8, 1893.* Miss Eastwood in the chair.

The following were elected to membership: Dr. C. F. Clark, Miss Anna T. O'Brien, Miss Alice Derrick, Dr. Mary G. Campbell, Miss Isabella D. Clark, Mrs. Jennie C. Kahler, Mrs. Ida M. Blochman, Miss G. M. Potter, Charles P. Grimwood, Mrs. C. E. Quigley.

*May 25, 1893.* President Dudley in the chair.

Prof. W. R. Dudley spoke on his investigations of the polarity of the leaves of certain species of *Wyethia* and desired notes on the subject from observers.

*June 5, 1893.* Dr. Gustav Eisen in the chair.

Mrs. Clara Ferrer and Prof. F. H. Hillman were elected to membership.

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## NOTES AND NEWS.

The zoologically little known northern portion of the peninsula of Baja California has been visited this year by two parties, both bringing back good collections of mammals, birds and reptiles. Messrs. Anthony and Thurber paid attention principally to birds and mammals, securing some new forms of the latter. Mr. Anthony's previous visit in 1889, supplementing the researches of Mr. Belding, leaves but little to be hoped for in the way of new forms of birds. The objective place of both expeditions was the high mountain San Pedro Martir. Messrs. Stowell and Lunt, of Leland Stanford Jr. University, spent nearly two months in the same region this summer and obtained a good general collection, especially of the reptiles, and have made some valuable observations on the mammals and birds, especially on the status of *Tamias obscurus*. Both parties are to be congratulated on their successful work, and the results when published will add greatly to our knowledge of the peninsula

fauna, where it blends to some extent with that of Alta California.

A new illustrated monthly journal, devoted to the nests and eggs of birds, is soon to appear under the editorship of Mr. H. R. Taylor, of Alameda, who is already known to oologists through these columns.

Mr. Charles A. Keeler has returned from a voyage around Cape Horn to New York, much improved in health from a cruise of over four months.

Mr. J. W. Blankinship has returned from a six weeks' collecting trip in Northern California, with a large collection of plants, many of them rare in herbaria. Among them may be mentioned *Delphinium uliginosum*, *Astragalus Rattani*, *Howellia limosa*, *Phacelia Rattani*, *Mimulus nudatus*, *Eriogonum tripodum*, *Brodiaea stellaris*, *Brodiaea rosea*, *Fritillaria pluriflora*, *Damasonium Californicum*.

The Herbarium of the California Academy of Sciences, by far the most important west of the Mississippi, is rapidly increasing in size. During the present year it has already been augmented by about 20,000 sheets. Besides the continual additions made by its curators in California, it has lately received by the generous kindness of the Gray Herbarium, the private collection of Dr. George Thurber; from Professor C. S. Sargent, of the Arnold Arboretum, a complete and carefully classified set of the trees and shrubs of that fine botanic garden. From Miss Eastwood it has received the plants collected by her during the whole of the last summer in Colorado and Utah; from W. H. Shockley, all the duplicates of his herbarium; from T. S. Brandegee, all the duplicates of his collections in California and Baja California; and from corresponding botanists, smaller collections too numerous for mention. These, in addition to the usual purchases, make a very large total for the first half of the current year. The permanent mounting of the plants on sheets of white paper is in steady progress. The mounting paper of the herbarium is of somewhat different dimensions from the ordinary standard in America, the sheets being 11x17 inches.

Professor Daniel C. Eaton, Yale University, New Haven, Conn., desires specimens of Sphagnum, or Bog Mosses, from California. They have been found in swamps near Mendocino City; at the head of Williams Lake, near Lassen Peak; in wet meadows, Mariposa Grove; in bogs near Kings River; Mt. Dana, Mt. Brewer, Upper Tuolumne Cañon, Yosemite Valley in the spray of Vernal Falls. The following instructions for collecting and preserving should be noted. They may be expected anywhere in cold bogs:

"All the plants for one series of sixty specimens should be gathered at one time and place, to avoid the chance of mixing two different forms under one number. The plants of dense habit of growth should be separated into broad, thin specimens while fresh, cleaned of foreign matter, and preserved in botanizing portfolios in the usual manner, *taking care not to subject them to any severe compression. Just enough pressure to keep them flat is enough.* Floating plants, such as the plumose forms of *S. cuspidatum*, are best prepared by spreading the specimens on letter-paper, as is usual in preserving the more delicate seaweeds. If the collector has no means of pressing the specimens, they may be gathered in bulk, and, when air-dried, sent in packages to Professor Eaton, who can have them softened and spread out for drying at some convenient time. Care should be taken to note the place and time of each collecting, and the approximate height of the station above sea-level."

Professor C. H. Gilbert and Professor O. P. Jenkins, of the Stanford University, have joined Dr. Barton W. Evermann, of the U. S. Fish Commission, in an expedition to examine the headwaters of the Columbia in regard to the fish fauna, the obstructions to the ascent of salmon, and the location of a salmon hatchery.

Professor W. E. Ritter, of the State University, has spent a part of his vacation in making, with the assistance of several of his students, a biological reconnoissance of Santa Catalina Island.

Professor C. H. Tyler-Townsend, of the Agricultural College, Las Cruces, New Mexico, has taken the position of Curator of the Scientific Institute at Kingston, Jamaica.

# ZOE

## A BIOLOGICAL JOURNAL

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VOL. IV.

OCTOBER, 1893.

No. 3.

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### SOUTHERN EXTENSION OF CALIFORNIA FLORA.

BY T. S. BRANDEGEE.

The flora of the Peninsula of Baja California has usually been considered to be nearly the same as that of Southern Alta California, and Mr. Hemsley for that reason has given it no place in his *Botany of the Biologia Centrali-Americana*. A region extending through nine degrees of latitude, having California for its northern boundary and its southern portion lying within the tropics, with its northern vegetable life controlled by the alternation of winter and summer and its southern dependent on tropical rains, cannot possess a similar flora throughout its entire length.

There is a point situated between these extremes of latitude and differences of climate where there is a change in the flora, a change from that of the south to one that is in great part Californian. The middle latitudes of the Peninsula do not seem to have any well defined seasons of vegetable life, and the time of flowering may follow winter rains of the northern climate if they should extend southward, or the summer showers from the tropics when they reach northward. Even as far south as Magdalena Bay this shifting of growing season is apparent, and my own visits there have shown me that in two successive years all the annuals and most of the perennials burst into life with the new year in consequence of the December rains, but during a following year, in January, hardly a flower could be seen, most of the bushes were leafless and the only signs of vegetable life to be found were remnants from the profusion that existed in October after a series of heavy tropical rains. The point at which the most decided change in the flora is seen occurs at about latitude twenty-eight degrees, in the vicinity of El Campo Aleman, and Calmalli, on the divide between the drainage sloping

southward into the San Ignacio Lagoon and that running north-west into the Pacific.

It has been shown in Zoe\* that the flora of the Cape Region shows a greater affinity to that of Sonora than to that of Alta California and a preponderance of Mexican forms prevails as far north as Calmalli, where the vegetation, on account of the disappearance of southern plants and the accession of numerous northern ones, assumes a decidedly Californian aspect. Of course there is not as great a change as would be caused by the intervention of a high mountain range or a body of water, but at the lower and middle elevations the traveler from the south soon perceives a difference in the surrounding vegetation after crossing the low divide before reaching Calmalli.

East and west of this dividing region, higher and as yet unexplored mountains extend southward and doubtless carry along their summits many Californian plants to a lower degree of latitude, and the impossibility of drawing a line between the northern and southern floras is further shown by the fact of maritime species of the Pacific Coast extending their limits southward a greater distance than would be suspected, especially upon the islands, in the same manner as the more southern maritime flora is continued northward to those islands off the coast of Alta California.

There is another locality, equally important concerning the southern extension of Californian flora and especially interesting in that it must certainly be the most southern habitat of many plants. This interesting region is the high mountain known as San Pedro Martir, situated about one hundred and twenty-five miles southeast from San Diego, and much nearer to the Gulf of California than the Pacific Ocean. It is an extensive plateau rather than a mountain, having an elevation of seven or eight thousand feet and traversed by numerous rocky ridges reaching two or three thousand feet higher. It is the highest part of the elevated region extending southward from Campo and the Cuyamaca Mountains, which here culminates and falls away at the south to so low an elevation, that in crossing the Peninsula from

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\* Zoe iii, 223.

El Rosario to Calamujuet, no considerable range impedes the traveler.

The climate of San Pedro Martir is cold in winter; ice is formed on standing water even during the month of May, and like most elevated regions the rainfall is greater than on the neighboring lower lands.

The ridges traversing the plateau have a barren, desolate appearance, and the large rounded rocks with which they are covered form a striking feature of the landscape. Between these ridges little brooks arise and find their way at first through extensive green meadows, then run rapidly down the very steep mountain sides toward the Pacific Ocean. Trees of good size are found almost over the whole plateau and in some places are very abundant. *Pinus jeffreyi* is the most common, but on the ridges a few sugar pines (*P. Lambertiana*) and along the streams some cedars (*Libocedrus*) keep them company. In a few localities some "quaking asp," "cypress" and silver fir can be found but they are not common, and at the lower elevations one of the piñon pines, *P. Parryana*, is almost the only tree. Oaks that never become large enough to be called trees are plentiful and form part of the underbrush that in many places, especially on ridges, is so thick as to be almost impenetrable; this chaparral is made up mainly of Manzanita and Ceanothus. Other bushes are scattered about and often in some localities they are abundant; the most noteworthy of these being: *Garrya Veatchii* at lower and *Garrya Wrightii* at higher elevations, *Rhamnus Californica* in almost every place and a willow common along the streams.

Our present knowledge of the vegetation of Northern Lower California has been mainly derived from several collections by Mr. C. R. Orcutt, who has traveled from its northern boundary as far south as El Rosario and San Fernando; and from the explorations of Dr. Edward Palmer about San Quentin and Lagoon Head. Mr. Orcutt has published a catalogue containing names of plants growing in Lower California, but no definite localities are given. The results of Dr. Edward Palmer's collecting have been published by the Department of Agriculture, and the California Academy of Sciences has printed in its Proceedings an account of the plants found on the trip between Magdalena

Bay and San Quintin. All plants mentioned in these publications as having been collected about San Quintin and farther south have been omitted from the following list. The writer made an excursion in May during the present year to San Pedro Martir, starting from San Diego, and the appended list contains names of plants collected at their most southern known habitat, and on this account is not a complete one of the flora of San Pedro Martir as it might seem from the frequency with which the name of this mountain appears:

*Ranunculus aquatilis* L. Common in and about the ponds of San Pedro Martir.

*Ranunculus hydrocharoides* Gray. Very abundant in the ponds of San Pedro Martir.

*Aquilegia truncata* F. & M. Common on San Pedro Martir.

*Romneya Coulteri* Harv. This is often seen along the valleys between Tia Juana and Colnett, and it is abundant on the hills about San Pedro Martir.

*Dendromecon rigidum* Benth. Along the edge of the plateau of San Pedro Martir.

*Papaver Californicum* Gray. On burned ground twenty miles south of Tia Juana.

*Arabis Holboellii* Hornem. San Pedro Martir.

*Vesicaria Fendleri* Gray. San Pedro Martir.

*Barbarea vulgaris* R. Br. Common at the locality known as La Grulla, where it was probably introduced.

*Cardamine paucisecta* Benth. Cañon Salado.

*Viola pedunculata* T. & G. Colnett.

*Arenaria alsinoides* Willd. San Pedro Martir, perhaps its northern limit.

*Calyptridium monandrum* Nutt. Abundant from near Colnett to San Pedro Martir.

*Montia fontana* L. Very small plants growing amongst other vegetation in damp soil on San Pedro Martir.

*Sidalcea malvaeflora* Gray. Growing in the wet meadows of San Pedro Martir.

*Fremontia Californica* Torr. A single specimen was found in the Salado Cañon near Colnett.

*Linum perenne* L. Common on San Pedro Martir.

*Geranium caespitosum* James. San Pedro Martir.

*Rhus ovata* Watson. Common on San Pedro Martir.

*Rhus integrifolia* Nutt. This is usually a much branched shrub, but in some localities it becomes a tree having a diameter of more than a foot. It is known when large by the name mahogany.

*Rhamnus Californica* Esch. A very common bush on San Pedro Martir.

*Ceanothus cordulatus* Kellogg. A bush forming thickets six feet high. Flowers white and sometimes decidedly light purple in color. Highest elevations of San Pedro Martir.

*Ceanothus Greggii* Gray. Flowers white. San Pedro Martir.

*Ceanothus Palmeri* Trelease. Twigs green, leaves more or less dentate, flowers blue. The most beautiful species of *Ceanothus* on San Pedro Martir.

*Ceanothus hirsutus* Nutt. Slopes of San Pedro Martir.

**LUPINUS PALLIDUS.** Annual, a few inches in height, branching from the base, often spreading and forming tufts nearly a foot in diameter, densely strigose-pubescent and with some spreading hairs, leaflets five or six, spatulate, rounded at apex, 10-15 mm. long, usually much shorter than the petiole; stipules adnate for half their length: racemes short-peduncled, terminating the branches, capitate in flower, elongating but dense in fruit; bracts much shorter than the calyx: upper lip of calyx, 3 mm. long, deeply cleft into two divergent lobes; lower lip a third longer, oblong, very shortly three-toothed at apex; bracteoles none: corolla white without markings, about twice the length of the calyx; entirely glabrous; standard shorter than the wings and shortly cleft keel: ovary four-ovulate; pod pubescent, three or four seeded; seeds white marbled with black.

Sands in the dry bed of the creek near the Mission of San Vincente in northern Baja California, May, 1893.

*Lupinus truncatus* Nutt. Slopes of San Pedro Martir.



*Hosackia grandiflora* Benth. var. *anthylloides* Gray. San Pedro Martir.

*Hosackia decumbens* Benth. var. *Nevadensis* Watson. San Pedro Martir.

*Hosackia crassifolia* Benth. San Pedro Martir.

*Psoralea orbicularis* Lindl. Along streams among the foothills of San Pedro Martir.

*Amorpha Californica* Nutt. San Pedro Martir.

*Amorpha fruticosa* L. Guadalupe Creek.

*Astragalus circumdatus* Greene. Common on San Pedro Martir. The growing plants are prostrate and the fruit lies upon the sand in which it usually grows. The green pods are fleshy after the fashion of *A. Caryocarpus* and the surrounding margin which is said to be "quite peculiar" and suggested the name of the species, appears only after drying.

*Prunus emarginata* Walpers. San Pedro Martir.

*Rubus ursinus* C. & S. Growing about the foothills of San Pedro Martir.

*Fragaria Californica* C. & S. San Pedro Martir.

*Horkelia Californica* Ch. & Schl. represented in northern central California by broader leaved forms which have received various names, as *Potentilla Kelloggii* Greene, *P. elata* Greene and *P. frondosa* Greene (which appears to be quite the same as *Horkelia grandis* H. & A. Bot. Beech. 339.) appears to diminish the size of its leaflets as it recedes from the seaboard or goes southward. The southern and montane forms, *P. Parryi* Greene, *P. puberula* Greene, *P. Clevelandi* Greene and *P. Lindleyi* Greene (the latter substituted for *Horkelia cuneata* Ch. & Schl. on account of an earlier homonym, though there is an available synonym, *Horkelia Douglasiana* Nutt. Bot. Beech. 338.) reach on San Pedro Martir a leaf form almost as narrow as in typical *Ivesia*. There appears to be no character in the greater part of these proposed species to warrant their retention even as varieties. *P. multijuga* Lehm. is described without mention of the stamens, and including it in the synonymy of *Horkelia Californica* necessarily infers that the artist who made the drawing was mis-

taken not only in their number but in the character of the filaments.

*Potentilla Wheeleri* Watson. Growing on cliffs at dry, high elevations of San Pedro Martir. The plants are much larger than the original specimens and are very fragrant and somewhat glandular.

*Potentilla glandulosa* Lindl. San Pedro Martir.

*Rosa Californica* C. & S. San Pedro Martir.

*Rosa minutifolia* Engelm. Abundant near the coast from north of Ensenada to below El Rosario. It extends into the interior a dozen or more miles from the Pacific slope. In some localities most of the bushes produce white flowers.

*Amelanchier alnifolia* Nutt. San Pedro Martir.

*Heteromeles arbutifolia* Roem. Growing along streams about the foothills of San Pedro Martir. This bush does not seem to have been found between here and the mountains of the Cape Region.

*Heuchera rubescens* Torr. San Pedro Martir.

*Philadelphus serpyllifolius* Gray. Common amongst rocks San Pedro Martir.

*Ribes sanguineum* Pursh. San Pedro Martir.

*Oenothera biennis* L. San Pedro Martir.

*Megarrhiza Californica* Torr. This is common at lower elevations and has been found far south of San Quentin. Specimens of variations in the shape and outline of the leaf were collected from one locality—they show all degrees of lobing between entire and divided nearly to the centre. This leaf variation is common in western species of *Echinocystis* and characters based on forms of the leaf evidently have no value.

*Datisca glomerata* B. & H. San Pedro Martir.

*Cereus phoeniceus* Engelm. grows on San Pedro Martir and has been found as far south as Comondú.

*Cereus gummosus* Engelm. reaches to north of Ensenada, but the plants are dwarfed.

*Selinum capitellatum* B. & H. Common on San Pedro Martir.

*Velea arguta* (T. & G.) San Pedro Martir.

*Hydrocotyle ranunculoides* L. San Pedro Martir.

*Garrya Wrightii* Torr. San Pedro Martir. Also found in the Cape Region Mountains.

*Garrya Watchii* Kell. San Pedro Martir; the type was from Cerros Island.

*Symphoricarpos mollis* Nutt. San Pedro Martir.

*Sambucus glauca* Nutt. Not common on San Pedro Martir.

*Lonicera hispidula* Dougl. var. Common on San Pedro Martir.

*Brickellia Californica* Gray. San Pedro Martir.

*Aplopappus linearifolius* DC. Foothills of San Pedro Martir.

*Chrysopsis* sp. San Pedro Martir.

*Erigeron concinnus* T. & G. San Pedro Martir.

*Erigeron flagellaris* Gray. San Pedro Martir, a low form with rough pubescence.

*Antenaria dioica* Gærtn. San Pedro Martir.

*Franseria chenopodiifolia* Benth. From Magdalena Bay to north of Ensenada.

*Franseria bipinnatifida* Nutt. Sea beach at Colnett.

*Franseria camphorata* Greene. Mesas about Vallederos.

*Helianthus Californicus* DC. Very abundant on San Pedro Martir and San Telmo Creek.

*Leptosyne maritima* Gray. Nearly to Cape Colnett.

**MADIA VALIDA.** Perennial, suffrutescent, branching, two or three feet high, rather sparsely covered and the leaves margined with stipitate glands, the peduncular end of the branches long-hairy, leafy nearly to the top; leaves alternate, somewhat rigid linear-lanceolate, 2-4 cm. long, 4 mm. wide: heads 2 cm. long, rather narrow, outer bracts rather few (8-10) long, and narrow; completely enveloping the akene, the lanceolate tips spreading, inner bracts about as many united into a cup: rays 15-18 cm. long, broadly linear, bright yellow; akenes of the ray without pappus, glabrous, strongly compressed, striate, slightly falcate-

oblique; disk akenes numerous apparently fertile, striate, nearly glabrous with a pappus of 15-20 stout paleaceous awns 10 mm. long, plumose to the base, equaling the disk flowers and about a third longer than the akenes.

San Antonio, Lower California, on the road between Tia Juana and Ensenada, June 4, 1893. The plant looks much like some of the more glabrous forms of *Aplopappus linearifolius*.

*Hemizonia Parryi* Greene. This plant was collected near Cañon Salado with stems of the preceding year remaining attached to the root, showing that it may become perennial.

*Hulsea Californica* T. & G. Very common on San Pedro Martir. It is much less floccose-woolly than the form from Alta California.

*Chaenactis Parishii* Gray. Common on San Pedro Martir.

*Artemisia tridentata* Nutt. San Pedro Martir and San Telmo Creek.

*Senecio Lemmoni* Gray. Vallederos Creek.

*Senecio Californicus* DC. Colnett.

*Cnicus Drummondii* var. *acaulescens* Gray. Common about the wet meadows of San Pedro Martir.

*Cnicus Californicus* Gray. San Pedro Martir.

*Hieracium Brandegei* Greene. San Pedro Martir. Agrees with the typical specimen excepting that the pappus is longer.

*Taraxacum* sp. San Pedro Martir; perhaps introduced.

*Arctostaphylos Pringlei* Parry. San Pedro Martir. Blooming later and more viscous, with redder bracts and flowers than the other species.

*Arctostaphylos glauca* Lindl. San Pedro Martir. Very abundant.

*Sarcodes sanguinea* Torr. Not uncommon on San Pedro Martir.

*Frasera albomarginata* Watson. San Pedro Martir.

*Frasera Parryi* Torr. San Pedro Martir.

*Gilia bella* Gray. San Pedro Martir.

*Gilia inconspicua* Dougl. San Pedro Martir.

*Gilia floccosa* Gray. Slopes of San Pedro Martir.

*Gilia atractylodes* Steud. San Telmo.

*Phacelia circinata* Jacq. San Pedro Martir.

*Nama Parryi* Gray. San Pedro Martir.

*Eriodictyon angustifolium* Nutt. San Pedro Martir.

*Eriodictyon sessilifolium* Greene. is common in many places in the northern peninsula. Mr. Greene was mistaken in crediting it to Alta California, for Mr. J. M. Hutchings, the earliest recorded collector, states that the label quoted \* by Mr. Greene is an error and that the specimen was collected between Ensenada and Tia Juana.

*Convolvulus occidentalis* Choisy. Slopes of San Pedro Martir.

*Solanum Xanti* Gray. San Pedro Martir.

*Aphyllon fasciculatum* Torr. San Pedro Martir.

*Pentstemon centranthifolius* Benth. San Pedro Martir.

*Antirrhinum Nuttallianum* Benth. San Pedro Martir.

*Cordylanthus Kingii* Watson. San Pedro Martir.

*Mimulus Palmeri* Gray. Very abundant on San Pedro Martir.

*Mimulus Fremonti* Gray. Hills at foot of San Pedro Martir

*Mimulus brevipes* Benth. Near Vallederos.

*Mimulus cardinalis* Dougl. San Pedro Martir.

*Limosella aquatica* L. San Pedro Martir.

*Monardella linoides* Gray. San Pedro Martir.

*Acanthomintha ilicifolia* Gray. Hills about San Telmo.

*Audibertia incana* Benth. var. *pachystachya* Gray. San Pedro Martir.

*Stachys ajugoides* Benth. San Pedro Martir.

*Brunella vulgaris* L. San Pedro Martir. This appears again in the Cape Region Mountains.

*Monarda macrantha* var. *tenuiflora* Gray. San Pedro Martir.

*Rumex salicifolius* Weinm. San Pedro Martir.

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\* Bull. Cal. Acad. i, 201.

*Polygonum amphibium* L. San Pedro Martir.

*Eriogonum Wrightii* Torr. San Pedro Martir.

*Platanus racemosa* Nutt. Slopes of San Pedro Martir.

*Phoradendron juniperinum* var. *Libocedri* Engelm. Growing on *Libocedrus decurrens*.

*Phoradendron Bolleanum* Eichl. Growing on *Cupressus Guadalupeensis*.

*Arceuthobium occidentale* Engelm. On *P. ponderosa*.

*Euphorbia Palmeri* Engelm. San Pedro Martir. The specimens show the gland erose rather than crenate. It is common and usually yellow with a conspicuous *Æcidium*.

*Populus tremuloides* Michx. San Pedro Martir. Found growing in several places.

*Quercus agrifolia* Née. Base of San Pedro Martir, Santa Cruz Creek. Very large trees.

*Quercus Wislizeni* A. DC. San Pedro Martir, in the form of large bushes.

*Quercus chrysolepis* Liebm. Common on San Pedro Martir.

*Quercus grisea* Liebm. Very abundant on the higher elevations of San Pedro Martir.

*Quercus dumosa* Nutt. Hills near San Telmo.

*Sisyrinchium bellum* Wats. San Pedro Martir.

*Smilacina stellata* Desf. San Pedro Martir.

*Juncus triformis* var. *uniflorus* Engelm. San Pedro Martir. Sometimes so abundant as to redden moist ground. The specimens are all dimerous and even smaller than those noted by Dr. Engelmann.

*Epicampes rigens* Benth. San Pedro Martir.

*Elymus Sitanion* Schult. San Pedro Martir.

*Juniperus Californica* Carr. This large bush or small tree is common on the hills about the base of San Pedro Martir and has been collected much farther south.

*Cupressus Guadalupeensis* Watson. San Pedro Martir. Seen in but one locality.

*Abies concolor* Lindl. San Pedro Martir. Very few trees seen.

*Pinus Lambertiana* Dougl. San Pedro Martir. Not abundant.

*Pinus Parryana* Engelm. Common at the lower elevations of San Pedro Martir.

*Pinus ponderosa* Dougl. var. *Jeffreyi* Engelm. San Pedro Martir. The most abundant tree of the plateau.

*Libocedrus decurrens* Torr. San Pedro Martir. Not common.

*Polypodium vulgare* L. San Pedro Martir.

*Pellaea Ornithopus* Hook. San Pedro Martir.

*Asplenium septentrionale* Hoffm. San Pedro Martir.

*Woodsia Oregana* Eaton. San Pedro Martir.

*Woodwardia radicans* Smith. San Pedro Martir.

PERITYLE ROTUNDIFOLIA (Benth.) *Amauria rotundifolia* Benth. Bot. Sulph. 31; *Perityle Fitchii* Torr. Pac. R. Rep. iv, 100; *Laphamia peninsularis* Greene Bull. Cal. Acad. i, 8. Through the courtesy of Mr. W. Botting Hemsley of the Kew Herbarium, who has very kindly furnished us a few akenes of the type, the longdoubtful genus *Amauria* disappears at last from our flora. Exploration of the Peninsula of Baja California has in recent years been prosecuted to so considerable an extent, that the existence at a place so well known as San Quintin of a generic type not found by subsequent botanical visitors had become improbable, and attention was called to its possible identity with some known plant. It has not, so far, been found north of San Quintin.

The shape of the akenes, rendering it a somewhat aberrant *Perityle*, is responsible for the circumstance of its having been named in three different genera. The specific name *rotundifolia* is much the earliest, indeed *Perityle* has over *Amauria* precedence rather than priority. Like most of the other species the flowers of *P. rotundifolia* seem to be largely unfertilized, the akenes of the greater number being white and inane.

T. S. B.

## FLORA OF BOULDIN ISLAND.

BY KATHARINE BRANDEGEE.

In the centre of the great valley of California, where all its waters meet at what was once the deepest part of the immense lake contained by the encircling rim of mountains, there is a large area embracing many hundreds of square miles which is but little above the level of the sea. This meeting of the waters is a labyrinth of tortuous channels embracing green islands of all sizes, from the islet of a few rods, not yet firmly anchored and rising and falling with the tide, to such bodies of land as Grand and Sherman Islands many miles in length and breadth. Through the winding channels the river steamers and fishing sloops pick their way with ease, though the traveler, seeing them for the first time, becomes completely bewildered. The islands are all of the same formation, a pure and exceedingly fine vegetable mold arising from the decay of countless generations of "Tule" and without trace of sand or gravel. They are all either entirely or in great part below the level of the water, and in order to be habitable must have strong levees watched and maintained with sedulous care. The unleveed islands often have cattle pastured upon them, even in cases where the sod is so thin that the animals spend a considerable part of their time scrambling out of the ooze, into which the breaking of the crust has let them fall. The vegetation, however, though of a lush and vivid green, is coarse, and cattle do not at first thrive very well upon it.

Of those enclosed by levees and in cultivation, Bouldin Island is a good example and is of more interest to botanists than any of the others, for upon it, in the autumn of 1872, Mr. C. D. Gibbes collected the plants described by Dr. Kellogg in the Proceedings of the California Academy of Sciences under the names of *Hibiscus Californicus*, *Erigeron discoidea*, *Solidago elongata* var. *microcephala*, *Helianthus giganteus* var. *insulus* and *Hedeoma purpurea*. The island has an area of about a dozen square miles and is owned by four men, who lease the lands on shares to Italians, Portuguese and Chinese. It is surrounded by the Mokelumne River and its sloughs. The levee is built of clay dredged from



the bottom of the river, and is added to year by year, as it is constantly sinking. Both sides of the levee are fringed with a dense growth of willows, alder, and the ever present "Tule." The land slopes to the centre and is irrigated by means of guarded openings in the levee, care being taken not to admit an undue quantity of water. The island is dry on the surface for the most part, although the water is but a short distance beneath, and the winds often raise the light loam from the roads in swirling clouds of dust. The ground shakes very perceptibly from the passing of wagons, and in many places even from a footstep, a peculiarity which is somewhat unpleasant until custom has rendered it familiar.

The natural flora of the islands embraces but few species as would naturally be expected from the sameness of environment. It consists besides the prevailing "tules"—*Scirpus lacustris* and *S. Tatora*—in great part of *Psoralea macrostachya*, *Epilobium holosericeum*, *Solidago occidentalis* and *S. elongata*, *Baccharis Douglasii*, *Helianthus Californicus*, *Artemisia vulgaris*, *Apocynum cannabinum*, *Convolvulus Sepium*, *Stachys albens*, *Polygonum Hartwrightii*, *Urtica holosericea*, *Alnus viridis*, *Salix longifolia* & *S. sessilifolia*, *Typha latifolia*, *Cyperus erythrorhizos*, *Phragmites communis*, etc. The leveed islands abound in weeds as may be seen from the list appended. Their luxuriance in most cases far exceeds anything seen on the mainland, and the species are usually well diffused. The vegetation is late, the time of fullest flowering being in August and September.

The entire absence of many of the large genera and even families of Californian plants of the not distant mainland is very noticeable. *Ranunculus aquatilis* is the only plant belonging to that family to be expected, and even that has not been collected on Bouldin Island. There are no Caryophyllaceæ except a stray *Silene Gallica* or *Stellaria media*, no violets, no Saxifragaceæ, no Hydrophyllaceæ, no Polemoniaceæ except an occasional recently immigrated *Gilia squarrosa*, not a single Hemizonia or Eriogonum, and no plant belonging to the Orchidaceæ, Iridaceæ, or Liliaceæ, unless *Lilium pardalinum* should be found to occur in some places.

The list below is the result of a visit to Bouldin Island, Sep-

tember 6 and 7, 1892, and of a single day early in July of the present year. An inspection of other islands would undoubtedly add other introduced plants not yet known to our flora. It is not intended to be complete even for the flowering plants and ferns, but is approximately so. Those which are credited to our flora for the first time are marked \*. There remain as yet unidentified several which are plainly not native.

*Brasenia peltata* Pursh. The Slough in the centre of the island.

*Nuphar polysepalum* Engelm. The same locality.

*Sisymbrium officinale* Scop.

*Nasturtium curvisiliqua* Nutt.

*Capsella Bursa-Pastoris* L.

*Silene Gallica* L.

*Stellaria media* L.

*Portulaca oleracea* L.

\**Hypericum mutilum* L.

*Hibiscus lasiocarpus* Cav., *H. Californicus* Kell. About the banks of levees and sloughs. There seems to be no reason to consider it indigenous.

*Malva parviflora* L.

*Trifolium repens* L. Very common. *T. pratense* is one of the staple crops.

*Melilotus parviflora* Desf.

*Medicago sativa* L.

*Hosackia subpinnata* T. & G.

*Psoralea macrosachya* DC.

*Lathyrus venosus* var. *Californicus* Wats.

*Rosa Californica* Ch. & Schl.

*Rubus ursinus* Ch. & Schl.

*Potentilla rivalis* Nutt.

*Lythrum albicaulis* Bert., *L. Sanfordi* Greene.

*Jussiaea repens* L.

*Epilobium holosericeum* Barb.

*Epilobium Franciscanum* Barb.

*Epilobium paniculatum* Nutt.

*Oenothera biennis* L.

*Hydrocotyle prolifera* Kell. Very abundant and fruiting in great profusion.

*Apium graveolens* L. Not common as it is about the borders of the Suisun Marsh.

*Enanthe sarmentosa* Nutt.

*Cicuta Bolanderi* Wats. Often ten feet high or more.

*Cephalanthus occidentalis* L.

*Galium trifidum* L.

*Solidago elongata* Nutt. Six to nine feet high with a pyramidal panicle one to two feet long and half as broad.

*Solidago occidentalis* Nutt. Of great size and luxuriance—perhaps the most abundant composite of the island.

*Aster Douglasii* Lindl.

*Conyza Coulteri* Gray, *Erigeron discoidea* Kell. Frequent but not abundant.

*Baccharis Douglasii* DC.

*Pluchea camphorata* DC.

*Gnaphalium palustre* Nutt.

*Ambrosia psilostachya* DC.

*Xanthium strumarium* L. Abundant, probably brought in by sheep which are ferried from the mainland to the stubble fields in September.

*Xanthium spinosum* L. Less abundant than the last.

*Helianthus Californicus* DC. *H. giganteus* var. *insulus* Kell. Ten to fifteen feet high.

*Bidens chrysanthemoides* Michx. Common about the ditches.

\**Bidens frondosa* L. Very abundant about the roadsides.

*Matricaria discoidea* DC.

*Artemisia vulgaris* L.

*Senecio vulgaris* L.

\**Cnicus lanceolatus* Hoffm. Abundant and the only thistle observed on the island.

*Centaurea Melitensis* L.

*Lactuca scariola* L. Becoming common about the landings and roadsides.

*Anagallis arvensis* L.

*Apocynum cannabinum* L.

*Asclepias Mexicana* Cav. Infrequent.

*Heliotropium Curassavicum* L.

*Convolvulus arvensis* L. Abundant.

*Convolvulus Sepium* L. Common about the levees and banks of sloughs and about the marshy borders of the Sacramento and San Joaquin Rivers. The early flowers appear to hardly ever set their seeds.

*Cuscuta arvensis* Beyr. Abundant.

*Solanum nigrum* L.

*Scrophularia Californica* Cham.

*Mimulus luteus* L.

*Veronica Americana* Schwein.

*Utricularia vulgaris* L. Central Slough near the schoolhouse in company with *Brasenia peltata*, etc.

\**Mentha pulegioides* L. Occasional, occurring also near the county road at Paradise Cut about four miles from Lathrop.

*Hedeoma purpurea* Kell. changed by Dr. Gray in Bot. Cal. to *Micromeria purpurea*, proves to be *Mentha Canadensis* L. Dr. Kellogg's type is at Harvard. It is one of the rank abundant plants of the island.

*Lycopus sinuatus* Ell. In several forms.

*Lycopus lucidus* var. *Americanus* Gray.

*Nepeta Glechoma* Benth.

*Scutellaria galericulata* L.

\**Scutellaria lateriflora* L.

*Stachys ajugoides* Benth.

*Marrubium vulgare* L.

*Stachys albens* Gray. Abundant and often very tall.

*Lippia lanceolata* Michx.

*Verbena hastata* L. Very abundant and tall—five to eight feet high.

*Plantago major* L.

*Plantago lanceolata* L.

*Rumex maritimus* L.

*Rumex conglomeratus* Murray.

*Rumex crispus* L.

*Rumex obtusifolius* L.

*Polygonum amphibium* L.

*Polygonum Hartwrightii* Gray. Extremely abundant and of rank growth.

*Polygonum punctatum* Ell.

*Polygonum lapathifolium* L. Very abundant.

*Polygonum aviculare* L. Common.

*Polygonum Convolvulus* L.

*Amarantus albus* L.

*Amarantus retroflexus* L.

\**Amarantus chlorostachys* Willd.

*Amarantus*. Not yet determined.

*Chenopodium ambrosioides* L.

*Chenopodium album* L.

*Urtica holosericea* Nutt.

*Alnus incana* Willd. var. *virescens* Wats. About the levees and along the overflowed margins of the streams as far down as Antioch.

*Salix longifolia* Muhi.

*Salix sessilifolia* Nutt. var. *Hindsiana* Anders. The two common willows of the islands. In September, on Bouldin Island, they, as well as all the other trees, are half covered and disfigured by the great webs of a tent caterpillar *Hyphantria textor*.

*Populus Fremonti* Watson. Not common.

*Asparagus officinalis* L. A considerable part of the acreage of Bouldin Island is devoted to the cultivation of this plant. It is becoming abundantly naturalized, as might be expected from the profusion of seed.

*Typha latifolia* L.

*Lemna trisulca* L.

*Lemna minor* L.

\* *Speiodela polyrrhiza* (L).

*Alisma Plantago* L.

*Sagittaria sagittifolia* L. var., *S. Sinensis* Sims. The Chinese plant this for its edible tubers, and it has escaped and is thoroughly at home in nearly all the marshy lands of the Sacramento and San Joaquin. It ripens a very large number of seeds, which are widely disseminated by the waters.

*Juncus effusus* L.

*Juncus xiphioides* Meyer.

*Cyperus erythrorhizos* Muhl.

*Scirpus lacustris* L.

*Scirpus Tatora* Kunth.

*Scirpus Olneyi* Gray.

*Eleocharis palustris* R. Br.

*Carex*. Not determined.

*Panicum Crus-galli* L. The most common grass.

*Setaria glauca* Beauv.

*Phleum pratense* L.

*Phalaris Canariensis* L.

*Polypogon Monspeliensis* Desf.

*Agrostis alba* L.

*Agrostis scabra* Willd.

*Agrostis verticillata* Vill.

*Holcus lanatus* L.

*Phragmites communis* Trin.

*Lolium perenne* L.

*Hordeum murinum* L.

*Equisetum arvense* L. Abundant on the clay of the levee.

*Woodwardia radicans* Smith.

*Asplenium Filix-foemina* Bernh.

*Aspidium rigidum* var. *argutum* Eaton. Ferns were observed only about the levee.

Mosses, Liverworts and Lichens are conspicuous only by their absence, but fungi — parasitic on living plants — abound.

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## THE SPECIES OF AMBLYCHILA.

[With Plates xxviii, xxix.]

BY J. J. RIVERS.

Are there three species of *Amblychila*, or two, or only one?

Having before me the three forms that have received names, and having also Say's and Reiche's descriptions and also Thomson's "Monographie des Cicindelides" together with my description of *Am. Baroni*, I am well prepared as far as material is concerned to give a resumé of the luckless paths into which *Amblychila cylindriciformis* Say, *A. Picolomini* Reiche, and *A. Baroni* Rivers have been made to travel.

In 1823 Say published his description of *A. cylindriciformis*; in 1839 another form which belonged to the Dupont collection was described and figured under the name of *A. Picolomini* Reiche. This insect was said to have been found near the bay and port of San Francisco, California, in latitude forty-eight degrees north. The locality is considered altogether an erroneous citation, as San Francisco, Cal. is in thirty-seven degrees, forty-seven. The difficulty in the way of coming to an agreement in the identification of these insects is the fact that both our most learned coleopterists have pronounced Dupont's examples to be *A. cylindriciformis* of Say, while Reiche and Chaudoir consider them or some of them as a distinct species.

There appears much confusion concerning the identity of *A. Picolomini*. Thomson's monograph gives a copy of the

description and a figure from Dupont and Reiche, but calls it *A. cylindriciformis* of Say, though neither the description nor the figure agrees with it. I fear that the author of the "Monographie des Cicindelides" must have been influenced by reading the opinions of our two great coleopterists and copied the description and the figure of Dupont and Reiche without review. Look at the figure on plate 3, fig. 3 in Thomson's Monograph and guess what induced the author to call it *A. cylindriciformis* Say. The two species are abundantly distinct and I feel certain that such eminent men as Le Conte and Horn have not been shown the insect that furnished the figure illustrated in Thomson's Monograph. Dr. Horn recently wrote me that the French coleopterists considered my *A. Baroni* as a small example of *A. Picolomini*. I had already begun to be of that opinion, and after further consideration I must own that the French opinion is the correct one. I hold that there are two species, viz.: *Amblychila cylindriciformis* Say\* and *Amblychila Picolomini* Dupont Collection, Pl. 19 fig. 1 à 6 and Reiche† and that *Amblychila Baroni* Rivers is the male of *A. Picolomini*.

It appears to be an impossibility for anyone to write a correct history of *Amblychila* and formulate a reliable description, or at least one that will meet with the approval of the coleopterological fraternity. The description by Say is rather terse, there being an omission of the very coarse and distinct punctuation of the apex of the elytræ. Reiche seems to have done some bad work also, for his *Picolomini* is said to have these coarse puncturings on the apex of elytra, showing that he must have had both species under examination, for the examples from Arizona are impunctate at the apex of the elytra. Reiche says: "*de gros points irrégulièrement placés à la base et à l'extrémité des élytres.*" The third form, which I recently received from Peach Springs, Northwestern Arizona, and which I take to be Reiche's *Picolomini* and the species named *Baroni* from Southern Arizona, both have elytral apices free from points or punctures. So that Dr. Horn and others must have some other reasons for

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\* Trans. Amer. Ent. Soc. Vol. x Proceed. p. iv.

† Annales S. c. Ent. de France p. 557, 1839.



considering the Dupont specimens as those of the Texan form of *cylindriformis*. But what are we to do with the great bulk of the description by Reiche, which does not fit *cylindriformis* Say; and what with the figure in Thomson, which is a good portrait of my recent addition from Arizona? In the description of *A. Baroni* a glaring mistake was made in sex, calling the example a female when it should have been recorded as a male, as a subsequent examination proved it to be.

Say's description may be taken as fairly good. His application of the name is also good, as it would be applicable. The form is subcylindric or subquadrate, but neither of these terms would be appropriate to either of the other species or forms, because they are wider than deep, and altogether flatter insects.

DESCRIPTION: Form gracefully elongate-oval. Above wholly shining black with high polish. Beneath also shining black. Head subquadrate; clypeus with the usual marginal punctures; behind the clypeal suture are two punctures widely separated; behind the second or frontal suture are two punctures as in *A. Baroni* but there are about ten or twelve other punctures differing both in number and position from those seen in *Baroni*. Thorax strongly convex; longer than wide as observed from above; broad across the front and produced in the middle; much narrowed behind; from the front angles runs a well defined raised continuous marginal line which extends along the lateral and basal margins; an uneven longitudinal central impressed line begins infirmly on the basal margin and ceases about where the arcuate impressed line crosses the fore part of the disc. Elytra twice as long as wide; much flattened on the central area; two-thirds from sutural line arises a well-defined carina, it is high and sharp, beginning at the base and ending abruptly one-fourth from the apex. A raised line just as bold as the carina runs nearly parallel to it, but beginning a little short of the base and ending firmly and nearer the apex than does the carina, this line is punctured at wide intervals and becomes slightly serrate at the base. Another raised line, which might be termed the acute margin, begins on the basal angle but does not reach so near to the apex as the other line or the carina; this line is strongly mucronate and at the basal angle it becomes

strongly serrate. The central area forming the disc inside the carinae has at the base on each side of the suture four broken rows of muricate punctures, which are reduced to two rows at the middle, then reduced to one row and entirely obsolete before reaching the apex. In the space between the carina and the first raised line are alternate rows of muricate punctures, beginning at the base with two and increasing to four rows apically, but all becoming obsolete on the apex. Between the first and second line, the space is occupied by two or three rows of muricate punctures; between the second line and the real margin are from two to four rows of the same kind of punctures as before mentioned, but on the epipleural portion near the apex are some minute punctures without points, spines, or mucrons or bristles, but all the other punctures carry a bristle or stiff hair.

The reasons for considering this species *Picolomini* Reiche are numerous. It agrees in the main with the descriptions by Reiche and Thomson and also with the latter's figure though by some oversight he calls it *cylindriformis* Say, while it is a good portrait of the insect described above. Reiche says: "The only specimen I ever saw was a female." Now what has become of that insect or where is the specimen that furnished Thomson with his figure? The reasons for considering *Baroni* as the male of *Picolomini* are: It is of the same color, has the same kind of puncturing, and is wanting only in carina and complete raised lines; these, however, can be traced by close analysis. At the base of the elytra in *Baroni* the beginnings of raised lines are visible and the method of their formation is plainly discernible. The spines on the front margin of the punctures being depressed and fused into a continuous line by contact with their nearest neighbors, the keel formation begins. This is easily traced in *Baroni* but it being the male form there is not the same necessity for keels and carinae as there is in the female, of which sex *Picolomini* seems to be. *Cylindriformis* Say has little relation as a species to *Baroni* or *Picolomini*; the coloring and the style of ornamentation differ. In the former species the elytra are usually brownish, but in the latter black is the color. In the former two kinds of punctural markings are always present while in the latter there is but one uniform style.

*Cylindriformis* Say (not of Thomson) is closely punctured all over the elytra with large and small punctures on a rugulose ground. *Picolomini* and *Baroni* have but few punctures, far apart on a smooth ground and flat surface. The number of punctures in each species should be noticed: in *cylindriformis* there are about 230—240 on the central or sutural line and near the suture there are about 40. In *Picolomini* the whole number in the same area does not number over 40, while near the suture there are but three or four. On the deflexed portion of the elytra and covering the apex, large punctures occupy all available space. On the same part in the other species the apices are smooth.

*Cylindriformis*.

Length, 30 m.m.; color, brownish; surface of elytra rugulose and irregularly punctate; apex of elytra very coarsely punctured.

*Picolomini*.

Length, 25 m.m.; color, deep black; surface of elytra smooth and regularly punctate; apex of elytra with punctures scarcely visible.

Locality Peach Springs, Truxton Valley, N. W. Arizona. Altitude, 5000 feet.

Peach Springs is about sixty miles from the nearest boundary line of Nevada, and about eighty miles from the Californian state line. The regions traversed by the Colorado of the west and its western tributaries seem to be the habitat of *Picolomini*. The original statement that it was found near the Port and Bay of San Francisco, in New California, is presumably a mistake. The confusion may have arisen from copying from the ship's log, which gave the final clearing from the western coast as the port above cited. But I think that *Picolomini* went up the Bay or Gulf of California, and then followed the course of the Colorado and Gila Rivers. What suggests such a course is the fact that *Baroni* was found on the Gila and the *Picolomini* on the Colorado, and possibly *Picolomini* took his example a ♀ in the San Francisco Mountains.

The original description of *A. Picolomini* is appended.

AMBLYCHILA PICLOMINII Dupont Collection. (Voyez Pl. 19, fig. 1 à 6.)

Longueur 28 millim. largeur, 9 millim.

*Ater, nitidus; capite levigato; thorace subquadrato, levigato subcanaliculato; elytris obsolete punctulatis, lineis tribus elevatis; interstitiis, puncte profunde impressis.*

FÆMINA. Corps entièrement d'un noir brillant, poli.

*Tête*, lisse; deux enfoncements larges peu marqués, entre les yeux; deux points enfoncés au-dessus de chaque orbite.

*Épistome*, lisse; un gros point enfoncé de chaque côté.

*Labre*, lisse; de gros points enfoncés le long de sa marge; ces points, comme ceux des orbites et de l'épistome, servant d'insertions à des poils raides.

*Antennes* avec quelques poils rares; leur quatre premiers articles d'un brun noirâtre; les autres obscurs, pubescents.

*Palpes*, d'un brun noirâtre, avec l'extrémité de chaque article un peu clair.

*Corselet* aussi long que large, avec quelques rides transverses très fines; deux impressions antérieures, arquées, parallèles, obsolètes, et une autre droite, encore moins marquée le long du bord postérieur.

*Élytres*, presque le double plus large que la base du corselet, ovales, allongées, couverts de très petits points enfoncés presque effacés; carène effacée à son extrémité, n'atteignant que les cinq sixièmes de la longueur de l'élytre; une ligne élevée, aiguë, aux deux tiers du disque de l'élytre, vers la carène; une autre au tiers de l'épipleure, toutes deux plus courtes que la carène; une première série longitudinale de gros points enfoncés sur la disque, allant jusqu'à l'extrémité de l'élytre; une seconde semblable dans l'intervalle de la première ligne élevée et de la carène, et une troisième dans l'intervalle de la carène et de la seconde ligne élevée: celle-ci, comme la carène, crénelée par des points enfoncés très serrés; de gros points irrégulièrement placés à la base et à l'extrémité des élytres, et les épipleures couvertes de points semblables plus rapprochés; la plupart de ces points, précédés d'un petit point élevé, servant d'insertion à un poil raide. En dessous les segments de l'abdomen lisses, avec quelques gros points enfoncés de chaque côté.

Pattes couvertes de poils noirâtres.

Le seul individu que j'aie vu de cette espèce est une femelle: M. Dupont l'a dédié à M. Piccolomini, qui l'a trouvé au port ou baie de Saint Francisco, dans la Nouvelle-Californie [sic] sous le 48° degré environ de latitude septentrionale.—*Annales de la Soc. Entom. de France*, Tôme 8, 1839 p. 560-561.

## GENERAL BIRD NOTES.

EDITED BY WALTER E. BRYANT.

### LECONTE'S THRASHER (*Harporhynchus lecontei*) WEST OF THE SIERRA NEVADA.

On March 10 of this year I was at Onyx, just above the junction of the north and south forks of the Kern River, in a valley characterized by desert vegetation—cholla, sage and Spanish

dagger. While collecting through this growth, I heard the very well-known notes of Leconte's thrasher and found the author; but as is generally the case with this species, a bird seen is by no means in the cabinet. After chasing him for several minutes I got a long-range snap-shot, but lost him. Later I heard one or more others, but they could not be secured.

A. W. ANTHONY.

[In North American Fauna No. 7, Part II, Leconte's thrasher is recorded from the San Joaquin Valley, near Buena Vista Lake, upon the observations of Mr. Nelson. The maps which are published show that the distribution of the creosote bush (*Larrea tridentata*) and the northern distribution of Leconte's thrasher are almost exactly co-extensive.—W. E. B.]

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#### VAUX'S SWIFT AT REDWOOD CITY.

On June 25, 1893, Mr. C. Littlejohn of Redwood City collected a pair of these birds which had been seen about the town on several occasions, probably the same individuals, as none have been seen since that date. The first appearance of the species was in the fall of the previous year, when two or three were seen. In reply to a letter of mine, Mr. Littlejohn writes: "I too thought the swifts had been living in a chimney, and as I had never seen a chimney swift I thought these might be a pair of them that had found their way out to California. When they were taken they had a strong smoky smell, which they still retain in a less degree. I think the odor was too strong to come from any charred tree, as you suggested, and it reminded me strongly of the smell of an Aleut's hut in Alaska. The female was probably not nesting at the time."

Vaux's swift is an irregular summer resident of Sebastopol according to Mr. F. H. Holmes.

W. E. BRYANT.

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#### NOTE ON THE NESTING OF SAMUEL'S SONG SPARROW.

At Redwood City as at Haywards, Samuel's song sparrow is confined during the breeding season to the salt marsh, where it begins nesting early in March and has its young reared before the high tides in the latter part of May or first of June would interfere. This season I found them with young in the latter part of June in the woods and at the base of the mountains

about five miles from the marsh, which led me to believe that there, in limited numbers at least, they reared a second brood which they ordinarily could not do on the marsh for the reason mentioned above.

C. LITTLEJOHN.

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#### MONGOLIAN PHEASANTS OF OREGON.

The birds (*Pasianus torquatus*?) were introduced into the country by Hon. O. N. Denny, U. S. Consul-General at Shanghai, China, in 1882. There were something less than sixty birds, and they were turned out on an island in the Willamette River, but have since been scattered around in different localities. Mr. Denny also introduced the Golden Pheasant (*Chrysolophus pictus*) which I think have died out. An act to protect them was passed on October 24, 1882, and has since been renewed and is still in force, although almost a dead letter now.

The pheasants thrive best in the southern counties. They are not more destructive to crops than any other game birds.

BERNARD J. BRETHERTON.

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#### A MIGRATION OF BONAPARTE'S GULL.

On May 11, 1889, I observed several flocks of Bonaparte's gull (*Larus philadelphia*) flying down this (Pajaro) valley, westward toward the ocean, and they flew every night till the first of June. They commenced flying about seven o'clock, if foggy, or half-past seven if clear, and would fly till dark. The flocks had from five to fifty or more birds in each. Some nights flock after flock would go by and then again four or five flocks would be all I could count in an evening. The first flocks seemed to be old birds with black heads, and a few days later all the birds shot were in young or winter plumage. The stomach of one of the birds which I shot contained a piece of gravel and what looked like parts of black insects. Later I examined another which was full of whitish worms about three-fourths of an inch long and as large as a number fourteen wire.

I do not know why the birds should come down this valley or where they came from, but suppose they were migrating and had come from the San Joaquin River.

J. R. CHALKER.

## WILSON'S PHALAROPE BREEDING IN CALIFORNIA.

Yesterday [June 16, 1889] I was at the south end of Lake Tahoe and waded the swamp. I found a phalarope's nest but the eggs were hatching. An egg which was pipped looked almost exactly like a spotted sandpiper's egg—I could not have told the difference. The young, which were two in number, were quite dark buff with a black stripe from the top of the head to the tail, a small black stripe where the tail should be, three black dots on each side of the body and a black dot on each wing and side of head. The legs must have been two inches long and the feet nearly an inch, the latter as near as I can remember were of a lead color; the bill was about half an inch long. The old ones came quite close to me, flying about and uttering that peculiar quack of theirs.

WALTER D. BLISS.

## THE BOHEMIAN WAXWING IN CALIFORNIA.

The only record of the occurrence of the Bohemian waxwing (*Ampelis garrulus*) in this State, I believe, is that of a straggler taken by Dr. Cooper at Fort Mohave on January 10, about twenty-three years ago. The bird is probably only a winter visitant and the lack of winter observations in the high Sierra accounts for it not being better known.

The Academy of Sciences has six specimens which were sent in the flesh from Susanville by Mr. T. B. Sanders. Two were collected on February 2, 1892, and the other four on February 17.

W. E. BRYANT.

## A MESQUITE TINEID WHICH CONSTRUCTS A BAG-LIKE CASE FROM THE LEAVES.

BY C. H. TYLER TOWNSEND.

On May 15, 1891, I found two case-worms on mesquite (*Prosopis juliflora*), on the mesa to the east of Las Cruces, New Mexico. The larger case measured over 20 mm. in length. On May 31, 1891, the mesquite bushes on the mesa, for a mile to the east of town, were well stocked with the cases of this larva, the majority of the bushes having numbers on them. On May 13 1892, they were again observed to be very plentiful on the mesquite in the same locality. A moderately small and rather

slender black and yellow hornet was found on this date pulling one of the larvæ out of its case.

The cases of this species are constructed of little leaflets of the mesquite, fastened together longitudinally with silk into an irregular, more or less tubular bag-like case, so as to protect the larva inside. The leaflets which compose the case are always more or less eaten along the midrib, but not entirely through. The cases bear considerable resemblance to those of *Psyche confederata*. Hanging perpendicularly from the leaves while the larvæ are feeding, they give the mesquite bushes the appearance of being hung with miniature bag-worms.

Some of the larvæ in their cases were sent to Dr. Packard. They reached him as pupæ. From one of these an imago appeared, which Dr. Packard wrote me was "an unknown tineid." I am unable therefore to suggest the genus to which it belongs.

*Description of larva.* Length, 9 to 12 mm.; width anteriorly, nearly  $1\frac{1}{3}$  to  $1\frac{1}{2}$  mm. White; head black, somewhat polished, with a slight reddish area on each side dorsad of eyes; prothoracic segment with dorsum brownish black, except a median longitudinal whitish dividing line. Consisting of thirteen segments; appearing from above as though possessing two extra ones, since the two terminal segments each bear a transverse suture or wrinkle on dorsum. Head and prothorax about equal in width; third segment distinctly wider, segments 4 to 6 nearly same width as 3, 7 and 8 very gradually narrowing, 9 to 11 about or hardly as wide as 8, 12 and 13 gradually narrowing from 11, 13th segment a little more than one-third width of 3d. Head usually not retracted, a little wider than long; prothoracic and third segments a little shorter than head, 4 about as long as head, 5 slightly longer, 6 and 9 to 11 a little longer than 5; 7, 8, 12 and 13 about as long as 5. Head and prothorax chitinous, rest fleshy. Head subhemispherical, convex dorsally, with a few fine hairs on anterior border, and several on dorsum; all the other segments with a number of hairs (about ten) arising from minute papillæ, four usually being dorsal, the others lateral and ventral. Eyes consisting of six small but prominent bead-like glassy



white simple eyes, each with a minute pupil-like black dot; four arranged in nearly a semi-circle, with the exterior or convex side dorsad; the other two situated ventrad of the front one in the semi-circle, one anterior to the other. Labrum rather deeply notched anteriorly, light fulvous; adjoining border of clypeus narrowly concolorous. Antennæ sunken in a small excavation anterior to eyes, apparently two-jointed, joints about equal in length, second hardly narrower and terminated with a style-like hair. Mandibles rather stout, subquadrate in outline, flattened, faintly four-notched, therefore faintly serrate with four or five teeth. Maxillæ and labium whitish; maxillary palpi apparently two-jointed, basal joint stouter, terminal joint more elongate and slender. Three pairs of four-jointed true legs on the thoracic segments, terminated by a brownish chitinous claw. Five pairs of prolegs, on joints 7 to 10, and 13, the anal pair stouter, fleshier, and somewhat longer.

Described from two alcoholic specimens, perhaps not fully grown, taken from cases May 13 and 15. Color of head and body noted in life. The length of the segments is drawn from the better preserved specimen. The proportions are slightly different in the other.

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## BIRDS OF SAN PEDRO MARTIR, LOWER CALIFORNIA.

BY A. W. ANTHONY.

Mr. W. E. Bryant's excellent Catalogue of the Birds of Lower California has left but little to record from the northern part of that peninsula, but the notes furnished by the present writer were necessarily very fragmentary owing to the collections as well as many notes being inaccessible at the time. It is to correct this deficiency and at the same time record the observations of a trip through that region the past season that the present paper is offered. The expedition crossed the national boundary at Tia Juana, fifteen miles from San Diego, on April 17, 1893, and proceeded by easy stages to the western base of San Pedro Martir by way of Ensenada and Colnett. The first benches of the mountain were not reached until May 5.

Several days were spent at various camps between this point (7000 feet) and the gulf slope which was not reached until May 23. The return march was taken up May 27 and San Diego reached June 7.

During our southward march the migration was at its height and at the time that we left the higher parts of the mountain new arrivals were seen almost daily; it is not improbable that among these late arrivals some Sonoran species might have been found had our time permitted a more thorough investigation. It is probable, however, that most of the species inhabiting the pine belt were noted. The region embraced in the name of San Pedro Martir consists of a high plateau of about sixty-five or seventy miles in length by twenty in width, lying about twenty miles from the gulf, and with its greatest extent parallel with that coast. Most of the plateau would be embraced within the limits of  $30^{\circ}$  and  $31^{\circ}$  north latitude. The northern end rises to a height, in one or two peaks, of 12,500 feet, estimated, and from that point the ridges and peaks drop away by degrees until at the southern end they merge into the low, barren hills, common to the peninsula at this point. The east and northern slopes, however, are very steep and rocky, with only two or three almost impassable trails, while the eastern side presents along its entire length in many places a sheer precipice for thousands of feet.

A series of large open meadows is found at an elevation of 8000 to 8500 feet, surrounded by rough, rocky ridges and heavy pine timber. These ridges are characteristic of the entire region which is composed of soft, friable syenite, the softer parts of which in crumbling away have left huge masses of gigantic boulders forming ridges, in many cases impassable. A growth of yellow pine, *Pinus jeffreyi*, covers the ridges and slopes as low as 7000 feet altitude, where it gives place to a belt of scattered pifions, *P. Parryana*, reaching to 6000 feet or less, a growth of Manzanita and Ceanothus covers all of the slopes and ridges where it is too rocky for the pines to obtain a foot-hold, and in many places a small shrub oak was abundant. The streams, which were abundant, were all fringed with willow and a few Aspens were seen in some localities. Arising as this region

does from a sea of barren dry hills and reaching an elevation higher than any point south of Mt. Whitney, California, it is not strange that its fauna should be unusually interesting although its relationship is with that of the northern mountains.

The birds observed in the pine belt were limited as to species, but abundant individually. A few species were limited to certain localities and were not plenty, but as a rule all were generally distributed. The list has been somewhat extended to embrace a few species not belonging to the mountain region, but unless otherwise stated, all species were found on or about the mountain.

The following species are for the first time recorded from the peninsula:

*Carpodacus cassinii.*

*Peucaea ruficeps.*

*Melospiza fasciata heermanni.*

*Passerella iliaca megarhyncha.*

*Troglodytes ædon aztecus.*

*Phalacrocorax penicillatus.* BRANDT'S CORMORANT. In April, 1889, I was told of a cormorant that had been about my camp at Valladares, six miles from the base of San Pedro. A short time afterwards I found its body in the creek. It had evidently strayed from the coast and followed up the stream until, unable to find its way back, it had starved. A single bird of this species, or *albociliatus*, was seen at San Telmo, ten miles from the coast, April 30.

*Anas boschas.* MALLARD. Quite a number were nesting in the large meadows on top of the mountain when we arrived, May 13. A nest of eggs, on the point of hatching, was found by my brother, W. W. Anthony, May 17; the nest was placed in a hole under a pile of boulders by the side of the stream and very well hidden.

*Anas cyanoptera.* CINNAMON TEAL. A few pairs were nesting in La Grulla meadows, May 13. In October, 1887, this meadow was visited and large flocks of ducks of several species were found in shallow ponds formed by the early rains. They cannot, of course, winter in this region, as it is subject to

a fall of not less than six feet of snow, according to native testimony. Mr. Bryant has quoted me as reporting *A. carolinensis* at 9000 feet in winter, a mistake due to my own carelessness, probably. The species was found at that altitude in fall, but not above 1500 feet after November.

*Plegadis guarauna*. WHITE-FACED GLOSSY IBIS. At San Telmo they were usually seen during summer in small numbers about a large marsh above the settlement, and I think they doubtless bred there. Adults and young were shot at San Quintin in October.

*Tantalus loculator*. WOOD IBIS. In the fall a few wood ibis are to be found in all of the marshes and streams from Ensenada to Santa Maria.

*Botaurus lentiginosus*. AMERICAN BITTERN. Common in the marshes at Colnett and San Ramon, where it doubtless nests.

*Ardea herodias*. GREAT BLUE HERON. Common at San Quintin and north of that point, also seen to some extent inland. A colony was found nesting on San Martin Island on April 12. At this date most of the nests contained young, but one set of three fresh eggs were taken.

*Ardea candidissima*. SNOWY HERON. Very common all along the coast from El Rosario north. I think they nest at San Ramon, as they were seen at that point all summer.

*Ardea rufa*. REDDISH EGRET. Not uncommon at San Quintin.

*Fulica americana*. AMERICAN COOT. Coots were seen occasionally along the creek below Valladares in the fall. Young were found at San Telmo as early as April 1. A pair was found nesting on San Pedro in May, 1889.

*Recurvirostra americana*. AMERICAN AVOCET. Not uncommon at San Quintin, Colnett and Ensenada in fall, only seen, however, about the fresh water marshes.

*Actitis macularia*. SPOTTED SANDPIPER. One was seen at La Grulla, on San Pedro, May 14. Rather common along the coast.

*Agialites vocifera*. KILLDEER. A few were found in all the meadows on top of the mountain.

*Oreortyx pictus confinis*. SAN PEDRO PARTRIDGE. Since describing this race, I have secured a series of skins from San Diego County, California, that are practically identical with my skins from Lower California, San Pedro and Valladares, thus making it necessary to either ignore the Lower California bird, or to include Southern California in its habitat. I am unable to secure specimens from the type locality at present, and so cannot determine the status of the race beyond a doubt.

A single skin from the collection of the California Academy of Sciences, from Monterey, is slightly darker above and shows a conspicuous rusty edging to several of the secondaries, forming a patch on the closed wing not seen in any of my southern birds.

During the past season partridges were found in abundance all over San Pedro Martir and fresh eggs were taken from the time of our arrival May 5 to the last day, May 28.

In the Gaudaloupe Valley, forty miles south of Ensenada, several *Oreortyx* were seen in the thick chaparral of *Ceanothus*, almost down to the coast.

*Callipepla californica vallicola*. VALLEY PARTRIDGE. In October, 1887, this species was found to be quite common on San Pedro as high as La Grulla 8200 feet. It was again met with in April and May 1889 and the past season, but in comparatively small numbers. Birds taken in May (5th to 25th) contained in several cases eggs ready to be deposited.

Capt. C. E. Bendire, in "Life Histories of North American Birds," has recorded my observations regarding the non-nesting of this species during very dry seasons; this habit was again noticed the past season and under very favorable conditions.

Upon our return trip from the base of the mountain to San Diego the present species was abundant, but it was only in the well-watered valleys that they were paired or that young were seen. The past winter and spring had been unusually dry and in many valleys water was entirely absent and vegetation generally very scant and dry. In such localities quail were all in flocks and those that were shot showed little if any enlargement of the ovaries. Small young were seen at San Telmo, a well-watered valley, on May 30.

*Pseudogryphus californianus*. CALIFORNIA VULTURE. The first evidence that I found of the occurrence of the condor in Lower California was the finding of a dead bird in Guadalupe Valley, forty miles south of Ensenada and near the coast; later another carcass was found in the dry barren hills east of El Rosario, about 30° north, which was the most southern point where positive evidence of its occurrence was obtained. My brother, W. W. Anthony, reported seeing these birds at one time near Real Del Castillo in the San Rafael Valley.

On San Pedro Martir they are of rather common occurrence, being seen daily about the meadows at altitudes of 8000 and 9000 feet. The Indians told me that their nests were to be found on the high cliffs of the gulf slope and others informed me that they built in the tops of large pines.

I greatly doubt the last statement, however. Every Indian and Mexican gold miner is provided with from one to six of the primary quills of this species for carrying gold dust, the open end being corked with a plug of soft wood and the primitive purse hung from the neck by a buckskin string. All of the dead birds that I saw in Lower California had been killed for their quills alone.

*Cathartes aura*. TURKEY VULTURE. Common during the summer all over the mountain, usually seen in company with the condor and raven.

*Parabuteo unicinctus harrisi*. HARRIS'S HAWK. Through some mistake my notes on this species were included under the head of *Buteo lineatus elegans* in Mr. Bryant's list. During the last season Harris' hawk was seen in one or two valleys between Ensenada and Colnett, and in one or two places on San Pedro as high as 7000 feet. It was nowhere common, however.

*Buteo borealis calurus*. WESTERN REDTAIL. Very common throughout the northern part of the peninsula, and found nesting in abundance in the pines on San Pedro. Nearly all of the pairs seen last spring consisted of one very light colored and one melanistic bird. At La Grulla a pair of redtails were nesting near our camp. The male was a very light bird, while the female was so dark as to be several times mistaken for the dark

phase of *swainsoni*. On May 16 the female was shot as she rose from the nest, and on skinning her I found in her stomach the remains of a *Cyanocephalus* and a nearly complete rattlesnake that must have measured over two feet in length. On the following day the male was seen flying about the nest with another female fully as dark as his former mate, and I was surprised to see her feeding young ten days or two weeks old. I had supposed the nest still contained eggs. As it was such a clear case of adoption I concluded to leave them undisturbed, but the unfortunate male was doomed a few days later to lose his second mate which was shot by a member of our party; upon dissection this bird was also found to have a large rattlesnake coiled up in her stomach. We frequently saw redtails sailing about over the meadows with large snakes hanging from their talons.

*Buteo elegans lineatus*. RED-BELLIED HAWK. Not seen this season south of Ensenada. It seems to be confined chiefly to the creek bottoms where cottonwood and sycamore growths afford it convenient nesting sites.

My notes on this species in Mr. Bryant's list refer to *Parabuteo*.

*Buteo abbreviatus*. ZONE-TAILED HAWK. On April 24, 1889, two pairs were found nesting on San Pedro at elevations of 7000 and 7500 feet, and one of the birds secured. The past season only an occasional stray bird was seen, not over four or five, and no nests were observed.

*Buteo swainsoni*. SWAINSON'S HAWK. One of the most common species in all of the lower valleys, but does not seem to extend very high up on the mountain, as I do not remember seeing it above 3000 feet. One that I shot in the Guadalupe Valley on April 24 had its inner secondaries and tail feathers so badly burned as to render it unfit for the cabinet. The only explanation seems to be that the bird was hunting near some of the brush fires in the valley and attempted to take a rabbit or other game too near the fire, or perhaps it was attempting to cook its dinner.

*Aquila chrysaëtos*. GOLDEN EAGLE. No eagles were seen

on San Pedro the past season; they appear to be very rare there. At San Telmo a pair have for years nested in a cliff about ten miles from the coast, where they were seen in April of the present year.

*Falco sparverius* sub. sp.(?) SPARROW HAWK. One or two sparrow hawks were seen on top of San Pedro, but as no specimens are in the collection I am unable to say which race occurs there.

*Strix pratincola*. AMERICAN BARN OWL. Very common in the lower valleys, but not observed above the live oak belt at 3500 feet.

*Syrnium occidentale*. SPOTTED OWL. An owl that I think was this species was flushed from a live oak on the slope of San Pedro at about 4500 feet elevation. Mr. Bryant has recorded a bird that I saw near the same place in 1887.

*Megascops asio trichopsis*.(?) MEXICAN SCREECH OWL. Screech owls have several times been seen and heard between the coast and the top of San Pedro, but as no specimens were secured the exact position of the sub-species is somewhat doubtful.

*Bubo virginianus subarcticus*. WESTERN HORNED OWL. Very common in the pine timber of San Pedro and in the coast valleys where there is timber enough to afford it shelter.

*Speotyto cunicularia hypogæa*. BURROWING OWL. Seen in several of the valleys between Tia Juana and San Telmo. I think none were seen above that point. On June 9 an entire family were seen in the Carriso Valley, perched on the bushes about the burrow.

*Glaucidium* sp. (?) PIGMY OWL. At Valladares, near the base of the mountain, two were seen by a member of our party, but not secured.

*Geococcyx californianus*. ROAD-RUNNER. Common in the lower valleys and slopes of the mountain. One was reported to me from 7000 feet.

*Ceryle alcyon*. BELTED KINGFISHER. One was heard on two or three occasions at La Grulla, on San Pedro. Common on the coast in winter.



*Dryobates villosus hyloscopus*. CABANIS'S WOODPECKER. Not uncommon in the pines on San Pedro. Given as *harrisii* in my notes in Mr. Bryant's list.

*Dryobates scalaris lucasanus*. ST. LUCAS WOODPECKER. A specimen taken April 30 at San Telmo and others seen. I have frequently seen *Dryobates* in the cacti along the coast hills from San Fernando north, but owing to their extreme shyness have usually failed to take specimens. It is quite probable that the notes furnished Mr. Bryant regarding the finding of *D. nuttallii* among the cacti of the coast belong to the present species, as I do not think I have ever seen *nuttallii* away from deciduous trees.

*Dryobates nuttallii*. NUTTALL'S WOODPECKER. Common along all the timbered streams as high as 4000 feet, or the limit of the live oaks and sycamores.

*Melanerpes formicivorus bairdi*. CALIFORNIA WOODPECKER. Well distributed through the pines on San Pedro, and probably resident; nowhere very plenty, but more common in the oak growth from Ensenada north.

*Colaptes cafer*. RED-SHAFTED FLICKER. Rather common on San Pedro, descending to the lower valleys in winter.

*Phalacroptilus nuttallii californicus*. CALIFORNIA POOR-WILL. Poor-wills were very abundant in the lower valleys in late April of the past year, but none were heard above 4500 feet until May 8, when one was heard at our camp at 7000 feet. They were heard at 8500 feet May 25, and one taken at the western edge of the mountain on May 28 was evidently nesting. They were much oftener heard than seen, as they are not much on the wing.

*Chordeiles texensis*. TEXAS NIGHT-HAWK. Quite common in the lower valleys, especially about the water holes; one seen as high as La Grulla—8200 feet.

*Cypseloides niger*. BLACK SWIFT. At San Telmo a pair of these swifts appeared about camp several times during the forenoon of April 30th, and one was shot by a member of the party; not noticed again.

*Chætura vauxii*. VAUX'S SWIFT. At Tia Juana April 16,

I found a small flock of these swifts flying about over a pool of water in company with *Petrochelidon* and *Tachycineta thalassina*. Later they were seen in several localities as far south as Colnett and San Telmo; at this point they were quite common April 30, and evidently migrating in company with swallows. A single bird was seen at La Grulla May 18.

*Aëronautes melanoleucus*. WHITE-THROATED SWIFT. Seen in several valleys between Tia Juana and the base of San Pedro but all evidently migrating. On top of the mountain they appeared about our camp by dozens and could easily have been taken in large numbers; they were mating and preparing to nest in the high cliffs on the eastern side of the mountain where I found them in 1889. A small colony was found nesting in the cliffs at San Ysidro in May, 1887. On the Coronado Islands, twenty miles from San Diego, a colony was discovered nesting in a cliff overhanging the surf, not over thirty feet above the water, but as usual the nests were inaccessible.

*Calypte costae*. COSTA'S HUMMINGBIRD. Very abundant in all of the valleys along the coast and base of the mountain; not seen in the pines until about May 20; on May 28 they were building at 7500 feet.

*Calypte annae*. ANNA'S HUMMINGBIRD. A very common resident of the coast region; not seen until May 15 at La Grulla. As this species, as well as the preceding, nest in March, sometimes as early as February in the lower valleys, it is not at all improbable that the birds that we found in May on the mountain had raised a brood before migrating.

*Tyrannus verticalis*. ARKANSAS KINGBIRD. One was seen May 15 at La Grulla, the only one seen in the pines; very common in the coast valleys.

*Myiarchus cinerascens*. ASH-THROATED FLYCATCHER. A few were seen on San Pedro in 1889, and again the past season, but it was not at all abundant; in the lower valleys it is more common. A nest and set of four fresh eggs were taken from a hollow on an elder in the Guadalupe Valley, June 2.

*Sayornis saya*. SAY'S PHOEBE. Quite common along the base of the mountain and in all of the coast valleys below 4000

feet. At Valladares they were given to nesting in all of the deserted mines, and I have found their nests twenty feet below the surface of the ground in an old shaft or tunnel.

*Sayornis nigrescens*. BLACK PHŒBE. Quite common along all of the water courses and resident as high as 3000 feet at least; a single pair were nesting at La Grulla May 22.

*Contopus borealis*. OLIVE-SIDED FLYCATCHER. Abundant throughout the pine belt, one in my collection from that region has a large, clear, white patch on the throat, lacking entirely the streaking common to that species.

*Contopus richardsonii*. WESTERN WOOD PEWEE. Very common in San Pedro; one that had its nest in a large pine over our camp on the night of May 28, kept up a calling at intervals of thirty minutes all night.

*Empidonax cineritius*. ST. LUCAS FLYCATCHER. Very common all over the mountain, especially along the streams and in the willows. It was evidently nesting at the time of my visit in May, but no eggs were taken. From its preference for willow thickets at this time I would expect to find its nests in such places as *E. wrightii* might choose.

*Empidonax pusillus*. LITTLE FLYCATCHER. Seen only during migrations.

*Otocoris alpestris chrysolæma*. MEXICAN HORNED LARK. Along the coast as far as Colnett, at least the horned lark belongs to this race as shown by specimens in my collection. At San Quintin, however, fifty miles further south, *pallida* is the race met with during the breeding season if not the entire year. Mr. Townsend's types of *pallida* came from the region just east of San Pedro, which with the San Quintin record on the west led me to expect this form from the mountain meadows. No larks were met with, however, until the eastern edge was reached; here a few were taken that were all true *chrysolæma*.

*Otocoris alpestris pallida*. SONORAN HORNED LARK. My notes were given to Mr. Bryant and published by him under the name of *rubra*. It seems, however, from the material I have at present that *pallida* is the form found at San Quintin during the

nesting season, giving away to *chrysolæma* a short distance to the north and east.

*Aphelocoma californica obscura*. BELDING'S JAY. The status of this race is in a condition similar to that of the San Pedro Partridge as already stated. San Diego County birds are indistinguishable from those from San Pedro, but I am unable to secure typical *californica* from Monterey, the type locality. It seems, however, from the series now on hand as if *obscura* would have to be reduced to a synonym of *californica*.

*Corvus corax sinuatus*. AMERICAN RAVEN. Very common from the coast to the highest point visited on San Pedro.

*Picicorvus columbianus*. CLARK'S NUTCRACKER. In May, 1889, a single specimen was secured at La Grulla from a flock of *Cyanocephalus*. Later the fragments of another were found where they had been left by a hawk or owl; not met with in 1893.

*Cyanocephalus cyanocephalus*. PIÑON JAY. Very abundant in the pines on San Pedro. Those taken had their stomachs full of beetles and insects that they had caught in the grassy meadows.

*Icterus cucullatus nelsoni*. ARIZONA HOODED ORIOLE. Very common along the base of the mountain and in all of the lower valleys, but not seen above the live oaks at 4500 feet.

*Scolecophagus carolinus*. RUSTY BLACKBIRD. The capture of a single specimen at the base of the mountain has been recorded in Mr. Bryant's list.

*Scolecophagus cyanocephalus*. BREWER'S BLACKBIRD. Common in all of the lower valleys; at San Vincente a large colony had taken possession of the old olive trees at the abandoned mission and dozens of nests with eggs were seen on April 28. At La Grulla they were nesting in the pines in early May; they were not noticed away from the large meadows, however.

*Carduelis cassinii*. CASSIN'S PURPLE FINCH. Not uncommon on San Pedro in the pines where it is probably resident; often seen in flocks of the following but very shy and difficult to secure. Not given in Bryant's list.

*Carpodacus mexicanus frontalis*. HOUSE FINCH. Abundant resident in all of the lower valleys; on San Pedro a few only were found upon our arrival, May 5, but they soon became abundant, especially about the meadows. Specimens from that region are not materially different from Southern California skins in my collection.

*Spinus tristis*. AMERICAN GOLDFINCH. A few winter about the base of the mountain.

*Spinus psaltria*. ARKANSAS GOLDFINCH. A common resident about the northern part of the peninsula reaching the lower slope of the mountain.

*Spinus lawrencei*. LAWRENCE'S GOLDFINCH. Common with the preceding species; not seen above 4000 feet on San Pedro.

*Spinus pinus*. PINE SISKIN. Well distributed through the pines on San Pedro, but undoubtedly not common; no nests were found.

*Ammodramus sandwichensis alaudinus*. WESTERN SAVANNA SPARROW. A few winter about the base of San Pedro.

*Ammodramus rostratus*. LARGE BILLED SPARROW. Very common in fall and winter all along the coast, but never wandering far from salt water. It is considerable of a mystery to me to locate the nesting grounds of this species. Thousands of birds are seen in all of the salt marshes along the coast from the northernmost limit of its range. No decrease is noticed in their numbers until the nesting season approaches, when they suddenly disappear and are not again noticed until August, when they make their appearance with young, and are common about the old haunts until the following spring.

On one occasion Mr. A. M. Ingersoll discovered at San Diego a bird carrying food for its young, but was unable to find the nest owing to the great distance to which the bird flew with its load. On the beach in April, 1887, I shot a female at San Ramon that had undoubtedly left her eggs but a few moments before. As the birds were scarce at that point and I was unacquainted with the rarity of their eggs, I made no effort to find their nests, and, although I have patiently searched for them ever since, I have never again seen birds during the nesting

season. The character of the ground at San Ramon, where a few were undoubtedly nesting, was a broad sand beach, covered with drift-wood, flanked by a few sand dunes, back of which was a series of small lagoons of brackish water, thickly grown to tules. The eggs of this species which are frequently offered to the public by local collectors of Southern California have, so far as my observations have gone, always been taken from the nests of *A. beldingi*.

*Zonotrichia leucophrys*. WHITE-CROWNED SPARROW.

*Zonotrichia leucophrys intermedia*. INTERMEDIATE SPARROW.

*Zonotrichia leucophrys gambeli*. GAMBEL'S SPARROW. All of the white crowns are abundant about the base of San Pedro during the winter months, and a few are to be seen in the pines during migrations. But few specimens were taken and the comparative abundance of the different species was not determined.

*Zonotrichia coronata*. GOLDEN-CROWNED SPARROW. Quite common during the migrations with the white crowns but seems to winter farther south than the bulk of these species. All of the *coronata* taken in April were moulting and unfit for specimens.

*Spizella socialis arizonæ*. WESTERN CHIPPING SPARROW. Very abundant about the base of the mountain and resident; one was shot at 7000 feet elevation May 10.

*Spizella atrigularis*. BLACK-CHINNED SPARROW. Rather common in the hills from the coast to the base of the mountain. I have no specimens from the pine belt, but am sure that its song was heard in May, 1887, at 10,000 feet elevation.

*Junco hyemalis thurberi*. THURBER'S JUNCO. It is quite probable that all of the Lower California records of *oregonus* belong to the present species. I found them about the base of San Pedro in winter with *townsendi*, and met with them in the Burro Cañon north of Ensenada April 23, the past season.

*Junco townsendi*. TOWNSEND'S JUNCO. Very abundant throughout the pine region of San Pedro, only reaching the lower elevations in winter. The past season the juncos were found building upon our arrival in the pines, May 5, but no

eggs were found until the 10th. A set of three were taken at La Grulla on the 14th, that were about to hatch. The nest was in an old woodpecker's hole in a large pine that had been blown down, with its top resting on a big boulder. The hole which was about six feet from the ground was on the under side of the trunk and the nest about on a level with the opening; it was composed of dry grasses and lined with deer hair. A nest which was found on May 26 in a hole in a rotten stub about ten feet from the ground contained three eggs slightly incubated. A number of nests, which were found under logs, boulders and similar locations and left for full sets, were all destroyed. Several birds were shot while carrying large bills full of deer hair for nest lining.

*Peucaea ruficeps*. RUFOUS-CROWNED SPARROW. A series of four skins taken between Tia Juana and the base of San Pedro are practically indistinguishable from Southern California examples; seems to be rather common in a few favored localities along the base of San Pedro.

*Melospiza fasciata heermanni*. HEERMANN'S SONG SPARROW. Through an error I referred the San Pedro song sparrows to *rivularis* in my notes published by Mr. Bryant. They seem to be true *heermanni*, however. Along the creeks and about water holes this form is more or less abundant from San Diego to the top of San Pedro.

*Passerella iliaca megarhyncha*. THICK-BILLED SPARROW. A few were seen in October on San Pedro and on one or two subsequent occasions at Valladares.

*Pipilo maculatus megalonyx*. SPURRED TOWHEE. Not uncommon in the Manzanita and shrub oak growth on San Pedro.

*Pipilo fuscus crissalis*. CALIFORNIAN TOWHEE. Very abundant along the lower slopes of the mountain, but rather rare in the timbered regions; confined here chiefly to the rocky ridges and Manzanita growth.

*Habia melanocephala*. BLACK-HEADED GROSBEAK. Quite common during migrations along the base of the mountain; a few

were seen as high as 4000 feet and were probably nesting at that altitude.

*Guiraca caerulea eurhyncha.* WESTERN BLUE GROSBEEK. Very common in all the coast valleys from San Quintin northward; usually seen in the region of cultivated fields and willow thickets. They were seen in the San Telmo up to within a short distance of the mountain.

*Passerina amœna.* LAZULI BUNTING. Abundant with the preceding species, with which it was often seen; one or two were seen on top of the mountain.

*Piranga ludoviciana.* LOUISIANA TANAGER. Quite common; not seen above 7000 feet.

*Progne subis hesperia.* WESTERN MARTIN. Very common; nesting in colonies from Valladares, 2500 feet altitude, throughout the pines.

*Petrochelidon lunifrons.* CLIFF SWALLOW. Common in colonies from the coast to the top of the mountain; they were found nesting on the sides of huge granite boulders in meadows of La Grulla May 13, and later on the eastern side.

*Chelidon erythrogastra.* BARN SWALLOW. A few were noted on top of the mountain; more common along the coast.

*Tachycineta thalassina.* VIOLET-GREEN SWALLOW. Very abundant from Valladares to the top of the mountain; nesting in hollow pines throughout the region visited. On May 19 a large number of females gathered about camp attracted by the feathers of some mallards that had been shot for the table. Usually the coveted feather was secured without the ceremony of alighting, the bird hovering over the pile until a feather was selected, and then securing it by a dainty dip of the head and immediately dashing off to the nest. A day or so later I shot a junco from a tall pine, which in falling detached a number of feathers. These were almost instantly secured by a flock of these swallows, and before a feather had reached the ground they were all appropriated with the exception of one long white rectrix which was several times caught and as often rejected.

*Ampelis cedrorum.* CEDAR WAXWING. Rather common about Valladares, where a specimen was secured May 4. I



have never seen any on San Pedro, but several times thought that I heard their call notes.

*Phainopepla nitens*. PHAINOPEPLA. Very common at certain times about the base of the mountain up to about 6000 feet.

*Vireo solitarius cassinii*. CASSIN'S VIREO. Not uncommon in the pines where it was first seen May 13; it became more common a week or so later.

*Vireo bellii pusillus*. LEAST VIREO. Very common all along the base of the mountain, but probably not reaching above the live oaks at 4500 feet.

*Helminthophila celata lutescens*. LUTESCENT WARBLER. Seen along the western base of the mountain and in all the lower valleys during the spring migration.

*Dendroica aestiva*. YELLOW WARBLER. Common during migrations in the valleys and as a summer resident in the higher altitudes. A single skin in my collection from La Grulla, No. 4031, May 15, is the brightest colored specimen I have ever seen from any locality, and also differs from others in my series in having a well defined dark shaft streak along the inner web of the tail feathers, occupying half of the web which is yellow to the shaft in all *aestiva* that I have examined. Unfortunately the specimen is the only one I have from that region, and I am unable to say how constant the character may prove to be.

*Dendroica auduboni*. AUDUBON'S WARBLER. Very abundant during migrations; one taken at La Grulla, May 13.

*Dendroica nigrescens*. BLACK-THROATED GRAY WARBLER. Rather common as a summer resident in the pine belt, nesting in the Manzanita thickets.

*Dendroica townsendi*. TOWNSEND'S WARBLER. During the past spring this warbler was first met with in the Burro Cañon, where a dozen or more were seen in the live oaks, April 23. As they were quite restless and somewhat difficult to identify, it is not improbable that *occidentalis* also occurred at this same place. They were again met with at Valladares, May 3, and on the following day on the west side of San Pedro at each of these localities they were quite common in the live oaks with *D. nigrescens* and *occidentalis*.

*Dendroica occidentalis*. HERMIT WARBLER. Quite common at Valladares and on San Pedro at 4500 feet; several were taken at each camp.

*Geothlypis trichas occidentalis*. WESTERN YELLOW-THROAT. A female was taken at La Grulla, May 1, 1889; not uncommon about the base of the range.

*Icteria virens longicauda*. LONG-TAILED CHAT. Common in the lower valleys, but only seen occasionally along the base of the mountain.

*Sylvania pusilla pileolata*. PILEATED WARBLER. Before we left the pine belt, this warbler had become common along the streams; more abundant, however, in the lower valleys during migrations.

*Anthus pensilvanicus*. AMERICAN PIPIT. A few seen in May, 1889, on the eastern edge of the mountain; abundant along the coast in winter.

*Mimus polyglottos*. MOCKINGBIRD. Probably does not extend above 5000 feet on the western slope of the mountain.

*Harporhynchus redivivus*. CALIFORNIA THRASHER. Not uncommon in the Manzanitas at 7000 feet, but rare above that point; a pair of Harporhynchus was seen in the shrub oaks at about 10,000 feet altitude that I thought was *crissalis*, but as they were not taken, the record is open to question.

*Campylorhynchus affinis*. ST. LUCAS CACTUS WREN. Common as far up the San Telmo Valley as suitable nesting ground was seen, about thirty miles from the coast. Mr. Bryant recorded it from as far north as San Quintin, fifty miles south of San Telmo.

*Salpinctes obsoletus*. ROCK WREN. One found nesting at 8500 feet; more common on the lower slopes.

*Catherpes mexicanus punctulatus*. DOTTED CAÑON WREN. Not uncommon in several places on San Pedro.

*Thryothorus bewickii spilurus*. VIGORS'S WREN. Common along the western slopes of the mountain.

*Troglodytes aedon aztecus*. WESTERN HOUSE WREN. Abundant in the pines.

*Sitta carolinensis aculeata* SLENDER-BILLED NUTHATCH. Rather rare but well distributed in the pines.

*Sitta pygmæa leuconucha*. WHITE-NAPE NUTHATCH. The most abundant species on the mountain; found everywhere in the pines. Upon our arrival May 5 this species was mating; noisy little companies of five or six to a dozen were seen chasing one another through the pines, chattering and calling from daylight till dark; although dozens of nests were discovered all were practically inaccessible. A favorite location for the burrow was on the under side of a dead branch, well away from the trunk of a large pine, and from twenty-five to a hundred feet from the ground. A series of over one hundred and thirty skins sustain the characteristics of the types to a very gratifying degree.

*Parus inornatus griseus*. GRAY TITMOUSE. Seen in several localities on San Pedro but not at all common. Specimens from the base of the range were identified as *griseus*, but as I have no specimens from the pine belt I can only surmise its identity.

*Parus gambeli*. MOUNTAIN CHICKADEE. Abundant in the pines but found chiefly in the region of Manzanita and oak thickets. In winter it was seen about Valladares and along the lower valleys.

*Chamaea fasciata henshawi*. PALLID WREN-TIT. Common along the lower slopes of the mountain and not rare in the highest altitudes where it nests in the shrub oak and Manzanita.

*Psaltiriparus minimus californicus*. CALIFORNIA BUSH-TIT. Not common in the pines, but noted from several localities; very abundant below 3000 feet.

*Regulus calendula*. RUBY-CROWNED KINGLET. Rather common during migrations.

*Turdus ustulatus*. RUSSET-BACKED THRUSH. Seen in the pines as late as May 25; a female taken May 21; it is possibly a resident of the pines, but those taken showed little enlargement of the ovaries, and it is more probable that they were belated migrants.

*Merula migratoria propinqua*. WESTERN ROBIN. Common along the base of the mountain in winter; a few were seen in May, 1889, at La Grulla, but none were noted the past season.

*Sialia mexicana*. WESTERN BLUEBIRD. Very common during migrations from sea level to the top of the range, a few lingering to nest with the local race. A series of seventy-five skins taken the present year during the nesting season sustain the characters of *anabelæ*, as set forth by myself in 1889, to a strong degree, only about 5% of the males showing an unbroken band of bay on the breast, which refers them to true *mexicana*, and many of the high-plumaged males of the *anabelæ* stripe were almost entirely without bay markings on either breast or scapulæ.

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### LEUCARCTIA RICKSECKERI.

DR. H. H. BEHR.

Mr. L. E. Ricksecker sent me four specimens of a *Leucarctia* which he raised from larvæ found on a species of *Senecio*, and after careful comparison as to description and figure of *L. albida*, Stretch, I think that Mr. Ricksecker is justified to consider them a new species.

As Mr. Ricksecker lives in the country, rather isolated from scientific intercourse, he has empowered me to publish and name the species. I call it after its discoverer.

*L. RICKSECKERI*: ♂ *grisea*, ♀ *alba*. In utroque sexu palpi annulis duobus et apice atro signati. Antennæ atræ supra serie punctorum minimorum candidorum signatæ. Abdomen luteum, crines basales segmentumque apicale albi, series punctalis dorsalis atra. Alæ ♂ ris anticæ griseæ fasciis dilutis obscuris, posticæ sordide luteæ puncto discali et duobus submaginalibus dilutis. In utriusque sexus alis anticis ad bifurcationem venæ medianæ puncto atro bene distincto notatæ.

*L. Rickseckeri* is about the size of small specimens of *L. Acræa*. ♀ wings immaculate, except a minute black discal spot on anterior wing. Body similar to *L. Acræa*, but with the black spots fainter, sometimes obsolete. ♂ thorax and anterior wings a diffused smoky color, immaculate except the minute discal spot. Posterior wings yellowish-brown with one discal and two or three submarginal spots quite indistinct and nearly obsolete. Both pairs of wings are brown underneath with a few variable obsolete black points.

I have very little to add to this description of the insect by Mr. Ricksecker. It is true the description of *L. albida* by Stretch could be construed into a description of *L. Rickseckeri* ♀. Mr. Stretch states that the specimen (a unicum) from which he described was in very bad condition, so that the discal point may have been wiped off in both anterior wings, and even the sex may have been mistaken, as the circumstance of the specimen being a unicum prevented dissection. No entomologist likes to destroy a unicum. But the characteristic of the palpi distinguishes the species at once and leaves no doubt as to its specific distinction. Coloration and markings of the ♂ distinguish the species from all American Leucarctias, and approach it to an East Indian species in our collection, which I received in several specimens from the coast of Arracan. This otherwise very distinct species has the same coloration as the ♀.

In regard to its biology, I give here again the words of Mr. L. E. Ricksecker: "June 11, 1891, I found three larvæ about full-grown, similar in general appearance to those of *L. Acraea* on a species of *Senecio*. They commenced spinning cocoons June 18, and three males emerged July 18, 1891. June 18, 1893, I visited the same place, and after a long day's diligent search I had twelve caterpillars. June 15, they commenced spinning cocoons; June 20, eight cocoons (the remainder escaped from cage); July 5-12, six imagines—♂ 2, ♀ 4. Two cocoons contained parasites. Locality, Sonoma County." These are the notes of Mr. Ricksecker's journal.

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## CALIFORNIA EARTH-WORMS OF THE FAMILY OF EUDRILIDÆ.

BY GUSTAV EISEN.

California, although a dry and rainless country for six months in the year, still possesses a varied oligochætological fauna rich both in species and individuals. The earth-worms—angle and rain-worms—burrow deep in the soil during the dry and warm months and lie there encysted and closely rolled up in clay chambers and waiting for the rain to set in in the autumn.

With these first rains in October the worms leave their self-made clay chambers and ascend to the upper strata where they live and propagate during the winter months, until April and May, when the same process of summer-rest is gone through again. In the large and dry valleys earth-worms are always scarce, owing, of course, to the greater dryness of the plains in summer time. In the driest places the worms are entirely wanting, except, possibly, in some bogs and swamps, where an indigenous species of *Allolobophora* is always common.

The higher earth-worms (the water-worms excepted) in California can be referred principally to two large families, *Lumbricidæ* and *Eudrilidæ*, there being besides one single species of *Acanthodrilidæ*. It must, however, be stated that the Pacific Coast has not been thoroughly explored, and many more species, genera and families, are likely to be discovered. A species of *Perichæta* is found in a nursery hothouse in San Francisco, undoubtedly introduced from the tropics. In the Baja California cape region other tropical forms appear, and the common earth-worm there is a species of *Urochæta*, as well as one or more of *Allolobophora*.

So far no true earth-worms have been described or even enumerated from California with the exception of two species described by Kinberg. About thirty years ago he visited California and described *Lumbricus apii* from Sausalito near San Francisco and *Pheretima Californica* from the same place. But the descriptions of these species are so insufficient that the worms cannot even be identified as to family, much less to genera and species. They must of course be ignored.

"*Pheretima*," he says, "has from forty to fifty-six setæ on every segment, and was found both in the hills of San Francisco and in soil at Sausalito." But though I have repeatedly searched in those localities I never succeeded in finding any worms thus characterized, and I am inclined to think that Kinberg's labels became mixed, and that *Pheretima* at least was never found in this State. Of the family *Lumbricidæ* California possesses probably a dozen species, some of which are common the world over. There are, however, a number of indigenous species, the description of which will be reserved for a future article. The most common of the *Lumbricidæ* is a large species of *Allolobo-*

phora, dark brown in color and which inhabits wet places. There is no *Lumbricus*. By far the most numerous worms belong to the family of *Eudrilidæ*. They are easily distinguished by their pinkish color, coupled with the fact that the male papillæ open in the posterior part of the clitellum. There are of this family two distinct genera with at least four or five species, some of which are large, others very small, resembling in size *Ocnerodrilidæ*, which latter genus is represented by at least one species, which however may be of southern importation, as its distribution is exceedingly limited. In Baja California two genera of this family are represented by at least two species, and in Mexico and Central America by many. It possesses a large southern distribution.

I have so far distinguished the following genera and species in California, of which a more detailed account is soon to be published in the publications of the California Academy of Sciences of San Francisco.

#### DELTANIA GEN. NOV.

Prostomium dovetails somite i. Eight setæ in four couples, beginning on somite ii. Setæ of the inner couples in the genital region converging towards the male pore. Buccal cavity, pharynx, œsophagus and sacculated intestine, but no gizzard and typhlosole, nor œsophageal pouches. Clitellum xiii to xvii. No dorsal pores. Testes in x and xi. Spermsacs present and free. Spermatheca present or absent. Ovary one pair in xiii, oviduct in xiv. No ovisac. Spermducts open in xvii together with a large paired prostate. The spermducts join the muscular part of the prostate in the body wall. Penial setæ open in the same duct as the prostate. No subneural vessel. The anterior few nephridia open in front of seta 4, the posterior nephridia in front of seta 3. All nephridia furnished with a large terminal bladder near the body wall.

Small, transparent, glossy worms with orange-colored clitellum, living in moist, especially sandy soil. The genus differs from *Microscolex* principally by the deltoid arrangement of the ventral setæ in the vicinity of the male pore.

The genus appears indigenous to the American Continent, species having, however, been found in Australia and Madeira,

though it is probable that the Australian species has been introduced from some other country.

There are at least three California species.

*DELTANIA ELEGANS* n. sp. Size two to four inches. Septal glands very small, the posterior one being the smallest. Spermatheca variable, very pellucid, assuming the nature of a spermsac. Spermsacs small, deeply lobed, one pair in xi and one in xii. Prostate helix-like at the top. Penial papillæ with two or more penial setæ in each sac.

Habitat.—San Francisco, Berkeley, Mount Diablo, Santa Rosa, or in general, the country surrounding San Francisco Bay. Is probably of a much wider distribution.\* This is the largest species of the genus so far known.

The most important feature of this species is the abnormal construction of the spermatheca. Instead of being a highly muscular and glandular organ with a muscular duct, it simply consists of a very thin-walled sac or membrane in which spermatozoa are stored. But the most peculiar fact connected with the spermatheca is, that it is variable in position, sometimes being median, sometimes paired, or sometimes entirely absent, thus demonstrating the great variability of the organ. This species differs from *Deltania dubia* Fletcher by having the anterior nephridium commencing already in somite ii, the latter species having the first nephridium in v.

*DELTANIA TROYERI* n. sp. A very minute species of the size of an *Enchytræus*, largest specimen about one and one-fourth inches by one-half line, while most specimens are smaller. Septal glands large, the one in vi the largest. One pair of large, opaque and permanent spermatheca with one pair of diverticula in ix opening viii/ix. One developed seta in each sac of penial setæ. Prostate tubular, not helix-like at the top. Penial exterior papillæ not prominent. The inner couples of setæ are further apart than in the following species. The diverticula of the spermatheca are about one-half or more longer than the spermatheca.

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\* Since writing the above I have found two species of *Deltania* in Baja California at Ensenada; the genus has thus a wide distribution.



Habitat.—Golden Gate Park, San Francisco, together with the former species. First found by Mr. Carlos Troyer, to whose interest and kindness I owe the possession of several new species of *Oligochæta*.

*DELTANIA BENHAMI* n. sp. Size about one inch by one-sixteenth. The inner couples of setæ as well as the setæ in the inner couples are much closer together than in any of the other species. The spermatheca large, opaque, in ix, opening viii, ix, with two diverticula, which are less than one-half as large as the central spermathecal sac.

A small, very hyaline worm, entirely distinct from the preceding species and at once characterized by the closeness of the ventral setæ, and by the size of the spermathecal diverticula. Much more pellucid than the preceding species. Blood yellow.

Habitat.—In the small cañon coming from Lake Chabot, Alameda County, Cal., under moss or in the top soil at the foot of trees near the creek.

#### ARGILOPHILUS GEN. NOV.

A genus related to *Plutellus* Perrier, but characterized as follows: Prostomium encroaches on the peristomium. Eight setæ in four couples, commencing in ii. The setæ of the inner couples not converging toward the male-pore, but closer set than the setæ of the outer couples. Buccal cavity, pharynx, œsophagus, gizzard, tubular-intestine, sacculated intestine, typhlosome, but no œsophageal glands or pouches. Clitellum not developed ventrally. Spermathecal pores between vii/viii and viii/ix. One or two longitudinal rows of ventral papillæ. Two pair of spermathecæ. Testes in x, xi. Spermsacs paired in x, xi, xii, some of which enclose the ciliated funnels. Two pair of spermducts, which join their respective very large coiled prostates in xviii, at the upper end of the muscular duct. Two penial setæ open in the same pore, but not in the same duct as the prostate. Nephridia without any vesicle at the body wall. Nephridia pores open variably, some in front of the third, some in front of the fourth, and others outside of, or lateral of the fourth setæ, without any serial regularity. Blood red.

Large earth-worms with thick round bodies and pale flesh—

color, marbled bluish. As far as known, California possesses two outwardly distinct forms, but which on account of their exact similarity as regards their internal anatomy, I must refer as subspecies to the same general species.

*ARGILOPHILUS MARMORATUS ORNATUS* n. sp. The ventral side of the genital somites furnished with two longitudinal rows of ventral sensory papillæ, one row on each side of the median line. The number of papillæ, which are strictly intersegmental, varies from one to seven or more.

Habitat.—North of San Francisco Bay as far up as Oregon. Very common in the vicinity of Santa Rosa, etc., especially in heavy moist, and rich clayey soil. The most common earth-worm of the region. This species was first found by Miss A. Eastwood of California Academy of Sciences:

*ARGILOPHILUS MARMORATUS PAPILLIFER* n. sp. The ventral region of the genital somites and posterior to the clitellum furnished with a single row of median intersegmental papillæ, varying in number up to seven or eight or more. The papillæ are generally longer than in the preceding species. Although I have examined hundreds of specimens I have never seen any transitions between these forms. If the papillæ in these subspecies were of constant number I would not have hesitated to pronounce them as equal in importance as species characteristics to the tubercula pubertatis in the true Lumbricidæ. The great variability in the number of the papillæ, however, place them in a somewhat different light, the only constancy of outward character being that in one form they are paired, in the other median. In the paired form they are situated one on each side of the ventral ganglion, while the median ones are situated directly under the ventral ganglion, one or one pair in each segment.

Habitat.—This form is, so far, found only south of the region inhabited by the former. I have specimens from Berkeley, San Joaquin Valley, Monterey, San Francisco, Palo Alto, etc., but only one single specimen from Santa Rosa, where the former form is most abundant. The species prefers very heavy adobe soil, and occurs only in the richest ground, never in poor soil. The occurrence of *Argilophilus* is always a sign of the fertility of

the soil. A single specimen of what appears to be a new species of this genus was brought by Mr. Louis King from Portland, Or., but being very badly preserved I must leave its description for some future time.

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CONTRIBUTIONS TO WESTERN BOTANY. No. 5.

BY MARCUS E. JONES.

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REVISION OF THE AMERICAN SPECIES OF *AQUILEGIA* NORTH OF MEXICO.

In studying the species of this genus a person is struck with the amount of labor wasted in describing them, and the uncertainty attaching to the species recognized. This is due largely to the multitude of characters belonging to the genus that are not given in any book and which most people do not know are generic. The really specific characters are few. There are two distinct lines of species in the genus so far as our western ones are concerned, which hybridize among themselves and possibly with each other. One line has petal-limb dilated above and flowers never truly red; the other has petal-limb not dilated above and red or reddish flowers. The following gives my views of this genus, though I am inclined to think that further research may prove that *A. flavescens* will become a variety of *cærulea*, *A. formosa* a variety of *A. Canadensis*, while the margin between *cærulea* and *chrysantha* is very slight.

*AQUILEGIA* L. COLUMBINE.

Parts of flowers in fives (except stamens) petal-like, alternate, stamens many. *Sepals* narrowed at base into a short claw and bent at base, usually acute, equaling the limb of petal or longer, widely spreading or reflexed, rather veiny, often green-tipped and simulating a gland. *Petals* either saccate at insertion or prolonged backward into hollow, usually tapering spurs which are short to four inches long and with a nectary in the tip set obliquely on the spur; limb of petals either almost obsolete or nearly equaling the sepals, usually rather thick, erect, and yellow, or sometimes white at least at the tip. *Stamens*

separate, many, an inch or less long, erect except in the first stages; anthers yellow, elliptical to oval, and usually obtuse at both ends, basifixed, one-half a line or less long, wider after bursting, filaments yellow and filiform at apex, white and enlarged and scale-like at base; next the ovaries is a sheath of sterile filaments which are enlarged throughout, nearly equaling the others, lanceolate, ridged, corrugated and white. *Ovaries* five, erect, closely aggregated, linear-cylindric, densely white-pubescent with glandular hairs up to the glabrous, filiform, persistent styles (two to four lines long) which with the ovaries are a trifle shorter than the stamens in flower, but the rapid development of the ovaries soon thrusts out the styles; stigma very small and capitate. At maturity the carpels lengthen to about an inch (half an inch in one case) and are linear, straight, but bent outwards at tip, cross section obovate, opening along the inner side from the oblique tip down, sparsely glandular-hairy, reticulated; seeds many, in a single row, horizontal, obliquely obovate cylindric, a line long, rounded on the back, with sharp inner edge, very black, smooth and shining when fully ripe, but less mature ones are brown. *Flowers* paniculate, racemose, or in one species single, the main stem sending off, usually above the middle, three to five branches remotely, each branch being subtended by a single leaf, branches a foot or less long, and lower half naked while the upper half has one to three flowers or rarely is again branched with one to three flowers on each branch, flowers terminal and centrifugal (central one blooming first). *Peduncles* usually with leafy bracts at base, and central one often with two in the middle, peduncles one to four inches long, more or less bent, but erect in fruit, longer than the flowers, glandular hairy. *Roots* perennial, fusiform, thick, with many short stout spreading branches at the top which are covered and much thickened with closely imbricated and old leaf sheaths. *Stems* tufted, erect, bent at base, tall (except in two species), usually leafless below, especially the lower third. *Leaves* with short, ridged sheaths one-fourth to an inch long; root leaves biternate (triternate in one species and with petiole absent in another), many, petioles long, generally about one-third the length of the stems; primary divisions of petiole two to four

inches long, secondary ones an inch long, or even all but the central one absent; leaflets irregularly two to three-lobed and the lobes entire to three to five lobed or toothed, and teeth rounded and blunt, leaflets obovate, cuneate, or broader, one-half to two inches long, seldom pubescent, glaucous or paler below; lower stem leaves similar with shorter petiole; upper stem leaves without a petiole; uppermost leaves reduced to simple or three to five-lobed usually leafy bracts which are usually acute; the development of the stem leaves depends upon the exposure inversely. The whole plant except the leaflets is covered with a glandular hairy pubescence which is scarcely visible at times and at others is very pronounced, but is of no specific value. It is most pronounced on the peduncles and young pods, and is more evident above. The genus frequents open woods in the East, and stream banks and moist mountain sides at rather high elevations in the West.

\* *Limb of petal somewhat dilated above, oblong to rhomboidal, large, at least half as long as the sepals, and about equaling the stamens, flowers not red. Petals rounded, truncate or emarginate. § Dilatæ.*

+ *Stems tall, often three feet high, nearly glabrous below; sepals acute, spreading, rather thin, nectary small.*

++ *Spurs long, straight, slender, two to four inches long, not shorter than sepals, nectary very small, apparently abortive; flowers large, one and one half to four inches wide, ascending; limb of petal four to six lines wide, six to ten long or even more.*

*A. cærulea*, James. Sepals white or lavender, lanceolate to broadly ovate, one to two inches long, occasionally tinged with pink or yellow; flowers two to four inches wide, petal-limb six to eight lines long, white to deep cream yellow, sepals and petals both frequently veined with blue, fragrant.

Abundant in Colorado at middle elevations 7000 to 11,000 feet altitude in all the mountains, mostly on moist mountain sides; very abundant in the Wasatch and Uintas at 8000 to 10,000 feet altitude and therefore subalpine, also in the Pine Valley Mountains in southern Utah; less abundant south and

west in the other ranges, also Mt. Ibapah in the Deep Creek Mountains, Jeff Davis Peak and the Schell Creek Mountains in eastern Nevada at high elevations, and probably in the East Humboldt Mountains; rare in Nevada and the Sierras of California, also northward to the Arctic regions. Much esteemed in cultivation where it is bluer.

*A. chrysantha*, Gray. *A. leptocera* var. *flava* Gray Pl. Wright 2, 9. *A. chrysantha*, Gray Proc. A. A. S., 8, 621. Flowers golden yellow throughout, one to two inches wide, spurs much longer than the sepals and very slender; sepals lanceolate, less than an inch long; petals as above.

Lower elevations 6000 to 8000 feet altitude in Colorado, and higher altitudes southward to 10,500 feet in Arizona. Rocky Mountains of Colorado from Colorado Springs south through New Mexico and Arizona. Not yet known in Utah. This appears to hybridize with *cærulea*, the flowers being yellow or tinged with blue and spurs shorter. Should it become necessary to recognize the varietal name, this will become *A. flava* (Gray).

*A. longissima*, Gray. Flowers yellow, spurs filiform, four inches long, and of about the same width throughout, petals nearly equaling the lanceolate sepals, elongated-spatulate. May be a form of the above.

Northern Mexico, Palmer.

++++ *Spurs short and thick, six lines long or less, somewhat hooked at the end, not longer than the small sepals, nectary large, flowers small, not even an inch wide and often very small, nodding or ascending, yellow, but often tinged with red or blue.*

*A. flavescons*, Watson King's Rep. 5, 10. Sepals lanceolate to oval, six to eight lines long; petal-limb somewhat dilated, about equaling the spur and nearly as long as the stamens, four lines wide, anthers elliptical-oblong, when the flowers are very small all the parts are small in proportion, except the stamens, which remain the same. All but the leaves often pubescent.

Six thousand to nine thousand feet altitude along streams in very wet, exposed, and boggy places, rarely at high elevations, most abundant at low elevations, cañons of the Wasatch from

central Utah northward to British America. It also occurs in the Uinta Mountains, but does not seem to exist in Nevada or westward. June to August. At high elevations it hybridizes with *A. cærulea*, the flowers being intermediate in size with shorter and stouter spurs than *cærulea*, whitish or tinged with blue.

+ + *Stems very short or none; flowers blue, small, one-half inch wide or less, spurs somewhat hooked, two lines or less long, shorter than the limb of the petal.*

*A. brevistyla*, Hooker. Flora Bor. Am. 1, 24. Stems six inches high or less, densely tufted, not surpassing the leaves, stem leaves petioled and scarcely differing from the others, pedicels two to three inches long, very slender; sepals oval and very obtuse and green to lanceolate, acute, and colored, four lines long, three lines wide; limb of petal oblong, yellow, a little shorter than the sepals and a little longer than the stamens; carpels about an inch long, and styles in fruit two lines long, anthers narrowly oval and very small.

High Alpine regions in meadows, Colorado and northward to the Arctic regions. Not seen in Utah or westward.

*A. Jonesii*, Parry Am. Nat. 8, 211. Named for Captain Jones. Monocephalous, peduncle two to three inches long; leaves all crowded and common petiole absent or nearly so; leaflets small, obovate, entire, nine; spur almost obsolete. Probably a form of the above.

Summit of Phlox Mountain, Wyoming.

\* \* *Limb of petal not dilated above, usually with a very short, triangular tip or narrower, styles four lines long, flowers red, rarely yellow, at least the tip of the limb of the petal yellow or white, acute to nearly truncate, sepals acute, stamens usually much surpassing the petals, spurs rather stout, generally somewhat hooked, nectary large, flowers nodding, one to one and one-half inches wide, tall plants. § Rubescentes.*

*A. Canadensis* L. Spurs one-half to twice longer than sepals, three-fourths to one inch long; sepals ovate one-half inch long; petal limb oblong to nearly square, four lines long, two to three

lines wide, nearly truncate; anthers elliptical, one-half line long. Upper leaves scarcely bract-like.

Open woods in the Eastern States. Seems to occur from Arizona to British America, in the Rocky Mountains rarely, at 8000 feet altitude or higher, but all these forms may be the next if it is distinct which is doubtful. Also in the San Francisco Mountains, Arizona Jones. May hybridize with *cærulea*.

*A. formosa*. Fischer, DC. Prod., 1, 50. Stout spurs about equaling the ovate sepals, five lines long, reflexed or widely spreading; petal limb three lines long, as long as broad, narrower at apex; stamens an inch long; anthers narrowly oval. Probably a form of the above, though the spurs are shorter and the upper leaves are more bract-like.

Along streams near the bases of the mountains, in cañons, 6000 to 8000 feet altitude. Said to exist in Colorado, frequent in western Utah, Nevada, and northward to British America, also Oregon, not found in California.

*A. formosa*, var. *truncata* (Fischer & Meyer), *A. truncata*, F. & M. Ind. Sem. Petr. Supp. 8. Differing from the above only in the limb of the petal being reduced to a rudiment. Intermediate forms seem to occur.

Along mountain streams at middle elevations in California and northward. May hybridize with *A. cærulea*.

\* \* \* *Spurless; leaves triternate, flowers white or pink.*  
*Peduncles very long.* § *Pseudaquilegia*.

*Aquilegia calcarata*, Eastwood, Zoe ii, 220, two feet high, very slender, stems inclined to be glaucous and whole plant minutely and sparsely glandular pubescent; leaflets distant and few, on capillary stalks, sharply cuneate at base, thin, an inch long, veiny; peduncles four to six inches long, very slender, erect; bracts lanceolate-ovate, three lines long, entire; flowers three-quarters of an inch wide, parts delicate, thin; sepals closely and parallel veined, lanceolate, acute, spreading; petals the same as sepals but more delicate, and barely saccate at base; stamens just equaling the petals; anther very small, narrowly oval; styles barely pubescent at base, longer than usual; ovaries minutely glandular pubescent when young, when mature almost



glabrous; pods one-half inch long, delicate. The peduncles are almost glabrous, and the stem leaves have the petiole reduced in my specimen to a sheath.

Damp alkaline soil under shaded cliffs in S. W. Colorado June to July. . Found first by Mr. Alfred Wetherill then by Miss Eastwood.

#### NOTES ON TOWNSENDIA.

This genus has always been a trying one to me because the descriptions have not fitted the plants as they grow. It now becomes evident that the trouble has arisen from the undue emphasis which Dr. Gray gave to the pappus, this being of almost no value. The glochidiate hairs seem to hold but there is one species in which there seems to be a transition in that respect. Although several species are said to be annual I have never yet seen a specimen that I would swear was an annual; most of these seem to germinate in the fall and put out a few leaves, while those said to be winter annuals are doubtless biennials; most of those said to be biennials are at least three years old, while few of them endure over four years, except perhaps *T. Fendleri*. All are early bloomers, for the altitude in which they grow, except *T. Fendleri* and even that may begin to bloom early but continues till frost.

Taking the order of Gray, *T. eximia* and *T. grandiflora*, Nutt. have glabrous rays. An interesting form from Labron, Colo., August 30, 1873, by Greene, has heads smaller than those of *T. eximia* and is diffusely and intricately branched, rigid, only minutely pubescent, with the scales and habit of *T. eximia* and the pappus of *T. grandiflora*. This is in the Herbarium of the California Academy. It may be a hybrid.

*T. Parryi*, Eaton. There are some points omitted from the description of the type by Gray. The leaves are acute, one-half to one and one-half inches long of which the blade is one-half and the petiole is slender; heads ebracteate; peduncle thickened above; scales ovate to lanceolate, soft and thin, scarious except midrib, acute, closely imbricated with no evident ranks but the outer successively shorter, not acuminate; heads six lines high; rays one inch long. This has widely lacerate scales, and is evidently a short lived perennial. From the type in the Herbarium

of the California Academy. This simulates *T. grandiflora* very closely but a specimen collected by Tweedy in May at a place in Gallatin County, Montana, tends to connect it with *T. florifer*. The heads are larger, and stems two to three inches high, spreading, lax; leaves spatulate, obtuse, and like those of *T. scapigera*. It is separable from *T. florifer* only by the perennial root, and the scales. The pappus of disk and ray are equal, and the ray is glabrous.

*Townsendia florifer*, *scapigera*, and *Watsoni* are manifestly much confused. The first was originally described as a perennial and is certainly a biennial at least, the second was described as perennial and is manifestly such but blooms the second year, the third is not a good species unless it covers many things referred to the first and the second by Gray, while its real character, a winter annual seems to have been overlooked by Gray or confused with the others.

*Townsendia florifer* (Hook.) Gray, as I understand it, is confined to Oregon, Washington and northwestern Nevada. It is a little ashy, but the leaves are usually nearly glabrous, and thick as though succulent; involucral scales about one-half as many as in *T. Parryi*, and definitely separable from that species only by the scales, which are green and ashy and much less imbricated; stems spreading, two to four inches long; leaves spatulate to linear-spatulate, shortly apiculate, the blade as long as petiole; heads one-half inch high and three-fourths inch wide; pappus equal in all the specimens I have seen. This is drawn from specimens in the California Academy from Washington, *Brandegee*, *Howell*; Virginia City, Nevada, *Brandegee*. Another form from Walla Walla by Mr. Brandegee has linear-spatulate leaves, acute, one to two inches long, and solitary heads on stout, leafy peduncles, which are ascending, and four to five inches long, rarely branched in the middle; whole plant ashy strigose to the scales; heads one-half inch high and very many. All the above forms are biennials. The rays are rough with yellow sessile glands on the outside. The plants seem to be confined to the valleys at low elevations, but may ascend the lower slopes of the mountains.

*Townsendia scapigera*, Eaton, so far as I know it, is rare. If all the plants which have been referred to it belong with it, the range is at least from southern Utah and northward to Idaho and westward to California, in the mountains at low elevations; *i. e.*, not alpine. Taking the type as given by Eaton in Bot. 40th, Parallel 5, 145, Fig. 17, my material from McIntyre's ranch, Utah, May 18, 1891, at 7000 feet altitude, corresponds with Eaton's type exactly, except that the plant is densely matted (surely perennial); leaves very narrowly linear, a little widened at apex, heads many and sessile, one-half inch high, three-quarter inch wide. Other characters not given by Eaton are that the rays are a line wide; lead-purple in the centre and with white margins, half an inch long, pubescent with white, rarely yellow, atomiferous gland-like bodies on the outside, rather firm in texture; leaves strigose and rough, thickish.

My material from Deep Creek, Utah, June 6, 1891, altitude 5500 feet, is the same as the above, except that the rays are only three lines long, and the leaves are spatulate and hoary strigose; plant two years old. My material from Schellbourne, Nevada, July 13, 1891, at 8000 feet altitude, is certainly three years old, and the same as Eaton's type, but closely branched; inner scales linear oblong, mostly acute, hyaline margin narrow; peduncles barely surpassing the leaves; very minutely pubescent; rays pubescent as in the above. My material from Wells, Nevada, is certainly perennial in small mats, whole plant white and rough with stiff hairs; peduncles with several bracts; scales linear, simply acute, sparsely strigose, lacerate margins rather wide; otherwise as in the type. The first form given under this species would be at once taken for *T. sericea*, but it is not that plant.

Other forms that may eventually prove to be *T. scapigera* I have given the provisional name of *T. montana*. To all appearances they make at least one good species. The type is a specimen from Alta, Utah, collected above the Flagstaff mine at about 9500 feet altitude, and therefore subalpine or alpine growing on rocky mountain sides. Loosely matted from a root at least three years old; leaves one and one-half inches long, blade oblanceolate and half the whole, nearly glabrous, but petioles rough with short hairs and under the microscope the blades are sparsely

pubescent, leaves fascicled at the top of the short branches of the root; heads one-half inch high, almost sessile and surpassed by the leaves, peduncles not lengthening with age; scales narrowly oblong, the outer the narrower, rounded at apex, the hyaline and lacerate margin narrow, midrib green; scales in about five ranks and the outer very short, inner scales one and one-half lines wide and shorter than the pappus; rays three lines longer than the disk, purple, three-quarter line wide; pappus alike and akenes glabrous; rays glabrous or nearly so. Another specimen which I refer to this I collected above Silver Lake in American Fork Cañon, Utah, July 30, 1880, at about 10,000 feet altitude, which is the same as the above, except that it is at least four years old and more loosely branched and leaves only an inch long. The inner scales are acute with rather wide lacerate margins, outer scales short, scales in at least three series; heads sessile. The glabrous akenes and habitat would indicate a distinct species.

*Townsendia Watsoni*, Gray. If Dr. Gray has not confounded this with the true *T. florifer* then this is not a good species. In order to find out I had two plants which I knew grew from the same seed sent to Harvard, one of them came back labeled "*T. florifer*" and the other "*T. Watsoni*." It is therefore evident that the varying pappus was considered a specific character by Dr. Gray and was used to separate the species, but it is of no value whatever in this group and is hardly of any value in the genus at large. From quite an amount of material from the northwest it seems likely that there may be some good characters left on which to separate the species, the chief one being that the true *T. florifer* is biennial or more, while our plant of Utah and most of Nevada is a winter annual, almost white with a rough strigose pubescence which is short or long, the scales are in about two ranks; rays very pubescent on the outside with flattened hairs with yellow gland-like tips. Our plants are never fleshy and the leaves are not thick. It is a more graceful plant, and grows in the valleys in very dry places and is an early bloomer, it soon dries up and blows away. It is the plant referred to by me in "Contributions No. 3" as being a diurnal with flowers opening between nine and ten o'clock A. M., and closing between five and six o'clock P. M. It is the only *Townsendia* of our

valleys and abounds in western Utah and eastern Nevada at elevations from 4300 to 5500 feet. If these distinctions given to uphold the species fail, then this species cannot be maintained.

*Townsendia sericea* Hooker. A form of this in the Herbarium of the California Academy collected by Greene in New Mexico, locality not given, has the scales of *T. Rothrockii* and the pappus and leaves of *T. Wilcoxiana*, tending to confirm a suspicion which I have long entertained that these two species are only sports of *T. sericea*, and are not valid. A form collected by Miss Eastwood at Mancos, southwestern Colorado, June, 1891, shows an approach to *T. incana*. The rays of *T. sericea* are glabrous.

*Townsendia incana*, Nutt. As I have already indicated *T. Arizonica* is a form of this species, being separable only by the pappus a worthless character. In looking over my material from Milford, Utah, 1880, and named by Gray himself, I find that the pappus of the ray is often one-half that of the disk and the heads are often short peduncled with all sorts of transitions between, the rays are glabrous except very minute atoms scattered over them. True *T. incana* usually grows in smaller mats in lower elevations and has the rays pubescent with flattened hairs which are tipped with yellow gland-like enlargements. It is very common in the Sonoran region of eastern Utah and southwestern Colorado, and blooms in May and June. An interesting form of this species is—

*Townsendia incana* Nutt. var. *ambigua*, n. var. This would suggest *T. grandiflora* in some things. Short-lived perennial but blooming the second year; leaves spatulate, acute, gradually narrowed into a long petiole one to one and one-half inches long; heads ebracteate, from sessile to peduncled, peduncle being sometimes three inches long, one-half inch high or more, one-half inch to an inch wide; bracts in two to three series, acute. In all the specimens which I have seen, the pappus is in the ray flowers less than one-third that of the disk flowers, of single scales that are very narrow and bristle-like; otherwise exactly as in the species, except that it is less branched than the type. Common with the type in the same region as the type. It blooms from the middle of April to June. Collected

by myself in several localities in 1891 and in the same region by Miss Eastwood in 1892.

*Townsendia glabella*, Gray. This plant seems to have been collected but very little. Miss Eastwood sends it from Mancos, Colorado, collected in June, 1892. Her plants are perennials in a dense caespitose tuft; bases of leaves villous otherwise glabrous, leaves spatulate to oblanceolate, acute, blade one-half to three-quarters inch long, two to three lines wide equaling the petiole; heads four to five lines high, on a naked peduncle one-half to one and one-half inches long; scales in two series the outer ones a little shorter and four to six in number, the inner six to eight, all lanceolate, acute (not acuminate) greenish at tip and with narrow hyaline margins; rays purple and glabrous; outer pappus one-quarter the inner; root not slender.

*Townsendia strigosa* Nutt. The usual form of this plant is a very pretty winter annual with glabrous rays, but one form collected in Wyoming at Church Buttes, July, 1873, seems to be a short-lived perennial. It abounds in the higher Sonoran region of eastern Utah and adjoining Colorado, and is abundantly distinct from *T. Fendleri* or any other species which I know. It does not exist in the mountains which are the home of the allied *T. Fendleri*.

*Townsendia Fendleri*, Gray. As I understand this species it is a summer bloomer continuing till frost, it seems to begin at a little below 6000 feet altitude and continues to at least 8000 feet. It is confined apparently to the mountains of south central Colorado and New Mexico, being found as far west as Glenwood Springs (Miss Eastwood). The stems are tall strigose and rough and usually decidedly perennial, though it blooms the second year. It is at once recognized by the narrow leaves, very rough pubescence, and much branched habit. The rays are glabrous.

#### NOTES AND NEW SPECIES.

*Thelypodium elegans*, n. sp. Biennial, two to five feet high, erect, slender, simple, or branched at the base often; glabrous except racemes and stems, at least the lower ones and rarely the young pods sparsely pubescent with long tangled wool; lowest

leaves oblanceolate, contracted into a broad margined petiole, usually finely denticulate but sometimes coarsely dentate, obtuse, lower stem leaves oblong-lanceolate and denticulate at apex, auricled, upper stem leaves lanceolate and the uppermost ovate, acute, broadly auricled, reduced; racemes one to two feet long, close, wand-like; pedicels five to eight lines long, ascending, rarely horizontal in fruit, slender in flower; sepals narrow, two to three lines long, obtuse; petals white or tinged with purple, four to five lines long, oblanceolate to oblong-obovate; anthers curved and always partly or wholly exserted; flowers usually one-half as long as pedicels; pods one-half a line wide, three inches long, generally spreading at an angle of  $45^{\circ}$ , occasionally bent in an arc downwards, but no specimens with pods all arched, pedicels never reflexed; stipe a mere rudiment; beak one to three lines long. This is a close congener to *T. ambiguum*, but pods stipeless, beaked, lower stems always pubescent, flowers much smaller and nearly white, and pedicels longer. A form from Green River Utah, that I refer to this species is simple stemmed and with appressed pods.

Westwater, Colorado, May 7, 1891, also adjoining Utah. Common on the adobe plains of the desert.

*Caulanthus crassicaulis*, Watson var. *glaber*, n. var. glabrous throughout. Otherwise exactly as in the species. Type from Summit near Sink Valley, S. Utah at 7000 feet altitude June 23, 1890. During the present year I have seen this occasionally in eastern Nevada along with the species. It is quite striking but passes into the type.

*Lepidium montanum*, Nutt. var. *alyssoides* (Gray Pl. Fend. 10). It is so manifest that this is only a more enduring form of *L. montanum* that it is useless to keep it up as a species longer. It passes by insensible gradations into the type.

*Lepidium Utahense*, Jones in Herb. This is the plant which Watson wrongly referred to *L. montanum* as a form of his var. *heterophyllum*. It was first published by me in my lists of the Flora of Utah collected in 1880 and published early in 1881 but without a description. In the thirteen years which have elapsed since, I have never seen anything to change my original opinion,

though at the time I deferred to his opinion. The plants were collected at Milford, Utah, June 23, 1880, at 5000 feet altitude, in alkaline meadows, being just in flower. Perennial from a deep, large, fleshy, erect root which is often divided at the apex into many dense crowns, the crowns are covered with many stiff dead leaf petioles and with some rosulate new leaves which are two to three inches long with margined petioles a little shorter than the narrowly elliptical blade which is entire, fleshy, barely acute at apex and cuneate narrowed at base; stems erect or the outer ones ascending, twelve inches or less long, simple, purplish at base, glabrous throughout even to the pods except a very minute pubescence on the upper stem which is denser on the pedicels and sparse on the sepals and long; stem leaves one to two inches long, fleshy, entire, barely acute, broadly linear, a little contracted at base but hardly petioled, not at all clasping nor auricled, one-half longer than the internodes, many, scarcely shorter above; spikes short, one to two inches long, sessile or nearly so in fruit, a mere head in flower; pedicels rather stout, short in flower, in fruit ascending but tips usually horizontal, three lines long, round, but with a ridge on either side and so seeming flattened, a little thickened at apex; sepals green, oval, very concave, rounded and hyaline at apex, three-quarter line long, often sparsely long-hairy; petals obovate one and one-half lines long, white; stamens apparently two with large oval anthers half as long as the stout filament, just equaling the short stout style; pods two lines long and a line wide, seeming acute at each end but minutely notched at apex, flat, not winged, elliptical, not corrugated, the two nerves very prominent and raised into a very narrow wing in the middle of the pod, of the same width as the style and seeming to be a prolongation of it; style one-third line long and much longer than the minute notch; pods erect and so at right angles to the apex of the pedicel. Distributed as No. 1821 of my Utah sets.

*Astragalus pephragmenus*, n. sp. Nearest to *A. glareosus*; referred to *A. Shortianus*, var. *minor* Gray. Perennial, matted from a much branched woody root, stems one to four inches long, spreading on the ground; stipules large and scarious, triangular, very slightly connate below, adnate to the petiole; whole plant



even to the pod shortly villous tomentose; leaves about four inches long, the petiole being one-third of it; leaflets eight to fifteen pairs, oval to elliptical, four lines long, greener above; peduncles including the rachis of the short spike equaling the leaves, stout, sulcate, ascending; bracts three lines long, ovate, scarious; flowers nearly sessile, six lines long, light purple, six to ten in a close raceme or short spike; calyx woolly, four lines long, teeth one-third the tube, subulate; keel two lines longer than the calyx and teeth, barely acute, incurved to one-third circle, purple tipped; wings about the same length as keel; pod an inch long, oblong, nearly straight, base rounded and jointed to a very short stout stipe one-third a line long, apex prow-like and abruptly acute (like *A. Preusii*), dorsal suture very slightly impressed, very narrow externally, ventral suture very thick externally, not impressed but pod often slightly bisulcate ventrally, suture one-half a line thick externally and widest in the middle of the pod; pod one-celled, three lines wide, very thick walled (one-twentieth inch thick in the dried specimen), inner wall dense, outer spongy; pod wrinkled longitudinally and obscurely so transversely; pubescence of pod minute but rather close and tomentose; hairs of the plant very slender, attached by the base and nearly smooth. This plant at once suggests *A. glareosus*, *Missouriensis*, and *Shortianus*, but differs from them all in apparently good characters. I doubt if any connecting forms have ever been known that would place this as a form of *A. Shortianus*.

This was gathered on the summit of the Pinal Mountains, Arizona, May 26, 1890 in rocky places. I have been inclined to place it as a form of *A. Chamaleuce* and the latter plant I think is the same as *A. glareosus* the older species, but I now regard it as a good species. It is in my sets recently distributed.

*Astragalus Purshii* Douglas. The very imperfect description of this plant given in Flora N. A. T. & G. is manifestly the type as it exists in the great region which it covers, but there are two errors in the description, the flowers are not one and one-half inches long and they are not yellow. Others have followed the same error as to color of the flowers, being led astray by the color in the herbarium and by old flowers; the flowers are white

when fully developed and as they fade or become old they turn to a rich cream color. I have never yet seen a truly yellow flower even in a herbarium specimen. It is one of the earliest spring flowers, coming out along with *Cymopterus montanus*, and is out of bloom in a month or less. I will give a detailed account of field studies on this plant in a later issue.

Through the kindness of Miss Eastwood and Mrs. Brandegee I have been enabled to examine all the material of the *Eriocarp*i in the Herbarium of the California Academy. Of *A. Purshii* I have seen material from Wyoming, Washington, and the Sierras as far south as Tehachapi and Tejon Mountain, California.

*Astragalus Purshii*, Douglas var. *tinctus*, n. var. leaves very broadly obovate, small; flowers purple, otherwise as in the type.

Edgewood near Mt. Shasta and also in Ventura County, Cal., Brandegee; Olanche and Keeler, Inyo County, Cal., Brandegee; the former also by Miss Eastwood, Soda Springs, Nevada County, Cal., 1882 Jones, and an intermediate form June 16, 1882, Austin Nevada, Jones. This seems to belong to western Nevada and the Sierra Nevada region. It should be remembered that the type of *A. Purshii* is stemless.

*Astragalus Purshii*, Douglas var. *longilobus*, n. var. Calyx lobes filiform nearly equaling the keel; peduncles as long as the leaves; otherwise as in the type. Tehachapi, June, 1884, Brandegee; Aurum, Nevada, May 4, 1893, Jones (not in fruit). Also Tanesville, Cal., June 30, 1892, Brandegee. This has very long stipules and pod of *A. inflexus*, but the woolliness of *A. Purshii*. Connecting forms occur, but as yet I have seen no specimens which I could not at once separate from *A. inflexus*.

*Astragalus inflexus* Douglas. A plant in the Herbarium of the California Academy by Canby from Washington, 1883, has a stem six inches high, with six leaves or joints from a closely branched root; whole plant white with long and very fine hairs, having a floccose appearance, but the hairs are not much tangled; stems zigzag; proper petiole an inch or less long; stipules and bracts the same as in *A. Purshii*, but usually wider; six lines long, hyaline, tapering from base to a fine, threadlike point; leaflets ten to fifteen pairs, elliptical, six lines long, sharply apic-

ulate, at least the most of them, acute at base and a little cuneate; nodes of stem shorter than the leaves, which are three to four inches long; naked part of peduncle as long as the leaf, erect; flowers racemose, few; fruiting pedicels one to one and one-half lines long; calyx hyaline, not much inflated, cylindrical, tube five lines long, teeth nearly the same and almost filiform except at short triangular base; blade of keel two lines long, purple tipped, very long clawed; wings a little longer than keel, and banner a line longer than wings; flowers not large and probably white; pods ascending, short-stalked and jointed at tip of stalk, as in *A. Purshii*, the stalk being one-third to one-half a line long and stout, pods simply shaggy as in *A. malacus*, fleshy, finely wrinkled, usually bent into a half circle, three lines wide, one to one and one-half lines thick, much obcompressed till the sutures nearly meet, with a very broad, shallow sulcus above and below, point of pod sharp but scarcely flattened; seeds rather large, a line long; pods cartilaginous.

Two forms which I refer to *Astragalus Ulahensis* T. & G. in the Herbarium of the California Academy are one from Candelaria, Nev., by Shockley, with flowers and peduncles of this species and the pubescence less woolly and stems not branched; and one by Brandegee from Pyramid Lake, Nevada, which is this species, but the pubescence is more that of *A. Purshii*.

*Astragalus leucolobus*.\* This is a specimen from Mr. Parish in my herbarium labeled "Watson"; if it has been published I do not know it. The plant is many-stemmed from a somewhat woody root and stems short, one to two inches long and decumbent; nodes shorter than the large, triangular, acute, hyaline, free stipules; peduncles four to five inches long, ascending, rather stout, three to five-flowered at the tip, and with flowers close together; bracts hyaline, broadly ovate to lanceolate, acutish, one to two lines long; pedicel almost none; flowers nearly horizontal, purple but lighter below; calyx cylindric, three lines long, one line wide, inclined to be narrowed at apex, base oblique; teeth very short, triangular, one-half a line long, erect;

It is probable that *A. leucolobus* is a clerical error for *A. lectulus* Watson Proc. Amer. Acad. 22, 472, as the description there given accords with the plant under consideration.

keel gently bent at tip into an arc of a circle, blade two and one-half lines long, less than a line wide, obtuse; linear wings barely surpassing keel; banner a little longer than wings and ascending; flowers about three lines longer than calyx, and calyx scarcely deeper cleft above and but little inflated; pods immature, but apparently about the size of *A. Purshii*, but base nearly straight and apex hooked, thin, sulcate dorsally one-half a line deep, cross section probably obovate-cordate, apparently very shortly stipitate in the calyx, white with a dense, very short pubescence. The leaves are two to three inches long, of about ten leaflets, which are close set, three lines long, elliptical to oval, obtuse; petiole one to two inches long; whole plant hoary with close, fine, short hairs. This has the look of *A. Utahensis*, but with shorter and stouter flowers and longer peduncles. It may not belong at all to the *Eriocarpi*, but its true position cannot be made out without mature pods. Collected by S. B. Parish in Bear Valley on San Bernardino Mountain, Cal., June, 1892.

To this I refer a specimen collected by Miss Eastwood on Cantua Mountain, Cal., May 19, 1893. It either belongs here or is a new species. The nodes are a little longer, short stems much branched; leaflets two lines long, oval; pods shaggy with dense long hairs as in *A. Utahensis*, hooked at the end as in this species; whole plant shaggy and hoary; pods immature. Manifestly closely allied to *A. Utahensis*.

*Astragalus lentiginosus*, Douglas. To this species I have referred with some doubt a plant sent by Mr. Brandegee from Lone Pine, Cal., May 16, 1890. It has the long peduncle of the var. *Fremonti*. The calyx is oblique and like that of *Hedeoma Drummondi*, a line long with lobes as long and subulate, cleft deeper above, hoary with white appressed hairs, flowers and pods horizontal; keel abruptly incurved to more than 90°, a line shorter than the ascending, linear-oblong wings which are rounded at apex, light purple; banner light purple, a line longer than wings, nearly erect, large, sides reflexed; peduncles four inches long, longer than the leaves, ten to fifteen-flowered above the middle, racemose; pods congested, oval, abruptly short-pointed, three-quarters inch long, one-half inch wide, papery, glabrous, or very minutely pubescent when young;

lower leaves small, upper the largest, these are oval to obovate, obtuse; stems many, erect, leafy.

I can see no character to surely separate this species from *A. diphyus* Gray, and it is not at all certain that it is distinct from *A. Coulteri*.

*Astragalus lentiginosus* Douglas. A plant collected at Alcalde, Cal., 1890, by Mr. Brandegee would fall under the variety *Fremonti*. It is evidently perennial, one and one-half feet high, erect, whole plant tomentose-canescens, sparse above; calyx densely black-hairy, cylindric-campanulate, three lines long, a line wide, teeth one-third the tube; flowers ochroleucous, five lines long; peduncles a little surpassing the leaves, densely flowered; pods very shortly stipitate and jointed at tip of stipe, sparsely hairy; leaflets about ten pairs, obovate; no petiole above.

*Astragalus latus* (*A. diphyus* Gray var. *latus* Jones, Zoe iii, 287). It is manifest that this is a distinct species as I have had a chance to study it this season from the beginning of its development to the end. It forms a loose mat on the ground, which is from one to two feet in diameter, the stems are short and the leaves long, the peduncles only half as long as the leaves and so the flowers are hid among the leaves, calyx thickened at base and the lower side the longer but straight, hyaline, white, sprinkled with minute black hairs, four lines long, one and one-half lines wide and a line thick, not bent nor uneven in width, cleft deeper above, teeth unequal, subulate, about a line long, inclined to spread; banner usually with sides not reflexed, ovate, four to six lines wide in the middle, bent abruptly at tip of calyx teeth at an angle of  $45^{\circ}$ , six lines longer than calyx, deeply notched at tip, thin and not thickened at base, light pink-purple, occasionally the outline of the banner is oblong, triangular or even fiddle shaped by the varying position of the sides; sulcus conical, and very small at its apex the tip of the keel; white spot obovate, cut up by radiating purple veins, reaches within one and one-half lines of the tip; wings narrowly oblong oblanceolate to broadly oblanceolate, rounded at apex which is often considerably enlarged, minutely notched on the lower side near the apex, one and one-half lines longer than the keel and purple at apex and lighter below, ascending  $45^{\circ}$ , concave to keel and

spreading at tip; keel straight, with tip incurved a little more than  $90^{\circ}$ , obtuse, purple at tip, exceeding calyx teeth by two and one-half lines; pods mottled, colored, or plain, sessile, very acutely long or short-pointed with incurved tip, much inflated, broadly to narrowly ovate, inclined to be retuse at base, cross section round or a little wider laterally, sulcate ventrally nearly to the middle and the contiguous sides not adherent, sulcate dorsally to beyond the middle so that the sulci meet but there is no septum between even when young, though the parts adhere, with age they separate, the contiguous sides of the dorsal sulcus adhere when young forming a false septum so that the pod seems to be only slightly sulcate dorsally, but as the pod matures the sides separate and so it becomes didymous, apex of pod not two-celled; mature pods chartaceous to membranaceous, immature pods slightly pubescent within with wall one-fortieth inch thick. Neither peduncles, stems nor petioles perceptibly sulcate; stipules adnate, triangular, not small, ciliate and inclined to be lacerate on the edge, acute, lower not larger; flowers loosely short-spicate; peduncles none to four inches long; flowers three to ten; pods prostrate as well as the flowers; whole plant very glabrous. This is a mountain plant coming down the cañons to 7500 feet altitude, grows on loose, gravelly places by the roadsides and is not abundant; it never grows in alkaline places. The pods are destitute of any internal sap at all times. It begins to bloom about May 1, and continues for a month; the pods are mature by the first of July.

By way of amplification of what I have said about the confusion in species of the *A. lentiginosus* and *curtipes* group (Zoe 4, 28) I append some notes on species kindly sent me by Mr. Brandegee.

*Astragalus* near to *oocarpus* San Thomas, Lower California, April 26, '93. Same as the following except more robust and tall; peduncles not longer than leaves, stout; stem coarsely sulcate; leaves six inches long; petiole none; leaflets about twenty pairs, an inch long; pods more acute; flowers white, four lines long, narrow, calyx the same; keel abruptly rounded, straight, nearly equaling the oblanceolate, scarcely ascending wings; banner erect, small, barely a line longer than the keel

and one-half a line longer than the wings; stipules green, rather stiff, reflexed, triangular, acute, two lines long.

*Astragalus* near to *Parishii*. Vallederos Creek, Lower Cal., May 4, 1893. Stems ascending, many from a perennial root, a foot high, nearly smooth; peduncles four to six inches long, longer than the leaves; flowers small, three lines long, yellowish, spicate at the tip of the peduncle, reflexed; calyx campanulate, tube a line long, teeth triangular, one-half a line long; pods an inch long and half as wide, broadly elliptical, sessile, spicate, horizontal, one-celled, chartaceous, much inflated, barely acute, dorsal suture much more convex than the ventral, ventral suture somewhat inflexed, sutures thin; seeds rather large, on short stalks, confined to the middle of the pod as in most of this group, several; stipules triangular, not reflexed, two lines long; pedicels less than a line long, about equaling the ovate bracts; petiole an inch or less long; leaflets oblong, about eleven pairs, obtuse at apex and acute at base. The pods are finely reticulated, glabrous or minutely pubescent when young.

*Astragalus* between *oocarpus* and *Parishii*. San Pedro Martir, Lower California, May 6, 1893. About the same as *A. Parishii*, but stipules almost hyaline and seldom reflexed; peduncles twice as long as the leaves, with yellow flowers above the middle; pod one and one-half inches long; keel arched, wings very much so. It is quite probable that one polymorphous species will cover most of this group.

*Astragalus Hookerianus* Gray. This neat little group represented by two supposed species can be described so far as known in two words, i. e., pods balloon-shaped. Mr. Brandegee's specimens from Susanville, Cal., June 30, 1892. Stems a foot high, decumbent at base only; very minutely pubescent; leaflets elliptical to linear one-third to an inch long, acutish, about seven pairs; leaves two to four inches long and proper petiole less than an inch long; peduncles four to six inches long; flowers racemose near the end of the slender peduncle, in fruit distant; pods two inches long, half as wide, papery, finely reticulated, more or less spotted, rounded at apex and tapering into a stipe, ascending or nearly erect, much inflated, sutures very small and not at all

intruded; seeds large, fully a line long and nearly round, on a stalk a line long, few, confined to the middle of the pod; calyx one and one-half lines long, campanulate, scarcely oblique at narrowed base; subulate teeth one-half shorter. The cross section of the pod is probably round.

Specimens collected by Mr. Lemmon in Sierra County have long underground stems and short ascending stalks, four inches high, decumbent; pods thicker, one-half as large, more attenuate, with the stipe only equaling the calyx; leaves ovate to elliptical, acute, with prominent midnerve and very hairy. This would seem to connect with *A. Whitneyi*. The pods of both these species are one-celled. The flowers are not found in these specimens, but are said to be white in the former and purple in *A. Whitneyi*.

*Astragalus proriferus* n. sp. San Pedro Martir, Lower California, May 5, 1893, Brandegee. Allied to *A. Hornii*. Shrubby at base, one to two feet high, stems ascending, whole plant hoary with very short woolly pubescence which is denser above; the flowers only are glabrous, not the calyx; leaves four inches long, with a petiole an inch or less long; leaflets about ten pairs, oblong-lanceolate and obtuse but apiculate, to obovate and obtuse and not apiculate, three to ten lines long and one to three wide, acute at base; stipules triangular, herbaceous, acute, two to three lines long, upper ones little reduced; peduncles stout, one-half as thick as stem, six inches long, erect, many flowered from below the middle, racemose in fruit and spicate in flower; flowers dark purple, but keel lighter, fading to ochroleucous; calyx broadly campanulate, tube a line long, oblique, cleft deeper above; pedicels almost obsolete shorter than the obscure ovate bract, teeth as long as the tube, subulate, erect; keel three lines long, bent abruptly to a right angle or more at tip, acute, arched a trifle; wings lanceolate and apparently notched at tip; banner rather large, nearly round, ascending 80° abruptly from a point beyond the calyx teeth, a line longer than wings and keel, emarginate; pods obliquely ovate to oval, six lines long, three to four wide, chartaceous, inflated, one-celled, neither suture in the least inflexed, dorsal suture not evident, ventral suture much thickened in the middle where only, it is



seed-bearing, sessile, rounded at base, early splitting the calyx, cross section apparently broadly obovate, tip with a very pronounced flat and sharp, triangular beak, two lines long; dorsal suture very convex, ventral slightly so; seed stalk one-half a line long. Flowers and pods horizontal or nearly so. The spike of flowers reminds one of those of *Oxytropis deflexa*.

*Astragalus inversus*, n. sp. Allied to *A. stenophyllus* and *collinus*. Susanville, California, July 1, 1892, Brandegee. Glabrous throughout. Stems flexuose two feet long, straggling upward, small, apparently simple, faintly angled, floriferous above the middle, nodes two to three inches apart; stipules, lower ones, rather small and united at base, the rest green and tapering to a long point and reflexed, four lines long, distinct; peduncles ten inches long, as stout as the stems, at least twice as long as the almost filiform petiole and leaflets; leaflets an inch long, distant, about three pairs, all jointed to the petiole; flowers loosely racemose on the upper half of the peduncle, six to ten, distant in fruit, ochroleucous; keel very gently arched at tip and blunt, narrow, rather long-clawed, six lines long, nearly equaling the narrow obtuse wings and small banner, the latter ascending only; calyx teeth very short-triangular, one-quarter the length of the campanulate tube which is one and one-half lines long and narrowed at base, not oblique, apparently equally toothed, dark and finely pubescent; pedicels a line or less long; bracts minute, ovate; flowers ascending, in fruit reflexed but not pendulous; pod long acuminate at each end, compressed, one and one-half inches long, two lines wide, linear, cross section elliptical or narrower, one-celled, sutures not prominent nor at all impressed, dorsal suture concave and ventral convex and so the pod seeming wrong side up; stipe not jointed, nearly an inch long about half as long as the pod; seeds nearly round, many. The pod is purple and streaked with white, cartilaginous.

*Astragalus collinus* Dougl. var. *Californicus* Gray. To this I refer with some hesitation a plant collected at Ager, Siskiyou County, California, July, 1887, by Brandegee. Glabrous, cartilaginous, reticulated pods two inches long, two lines wide, and stipe three-quarters of an inch long, cross section oval, seeds a line

long and oval; leaflets ovate to oblanceolate, six lines long; leaves three inches long and calyx softly pubescent and whole plant otherwise glabrous; peduncles six inches or more long, erect and as stout as the stems; calyx campanulate with tube two lines long, the short triangular teeth one-third as long as tube; flowers not seen; pedicels stout, a line long; bracts very small; many stemmed from a woody root, one and one-half feet high, but base of stem bent, branched below. This at first sight seems to be very distinct from *A. collinus* but I cannot refer it elsewhere.

*Potentilla (Ivesia) Kingii*, var. *incerta*, n. var. Densely white silky throughout; leaflets obovate or ovate, densely imbricated; leaves three inches long, more slender than the type. Otherwise as in the type. Alkaline soil in the middle of Steptoe Valley E. Nevada, 5700 feet altitude, July 13, 1891. I am not able to compare this with *Potentilla eremica*, Coville which from the description would seem to be the same, but this is manifestly only a variety of the type as it shades into it.

✓ *Cymopterus purpurascens* (Gray) *C. montanus* var. *purpurascens* Gray Bot. Ives. I cannot think that this plant which is so common from one end of Utah to the other and covers so wide a range is a form of the Rocky Mountain species which so far is not known west of the mountains of Colorado.

*Cymopterus Fendleri* Gray. This species belongs to my section *Coloptera* and to it should be referred *C. Parryi* (C. & R.), *C. decipiens* Jones. I was misled by Watson's unwarranted reference of one of my specimens to *C. Fendleri* or I should have recognized the true place of *C. Parryi* in the synonymy.

*Frasera speciosa* Douglas var. *scabra* n. var. Closely resembling the type except that the root leaves are six to eight inches long, one and one-half inch or less wide; whole plant ashy scabrous even to the petals; the leaves are very nervose (seven of the nerves being very prominent), thick; petals oblong, three-quarters inch long, very obtuse and rounded; glands as in the type but very coarse, three to four lines long, attached below the middle and running nearly to the base, oblanceolate, acute at base, coarsely fringed; scales at base of petals coarse; anthers

reflexed, two lines long; stigmas enlarged and club shaped. This seems to be a good species but in view of the great variability in this genus I refer it here. It is about the height of the type, but the leaves are half as large and the flowers twice to three times as large. Collected at Pine on the edge of the Mogollon Mesa northern Arizona, June 2, 1890. Characters common to the type species and this are the long pedicels, narrow and very acute calyx lobes, equaling the corolla; greenish-speckled petals, glands and scales; verticillate leaves; stamens nearly as long as the petals; glands attached below the middle. Gray says in the Synoptical Flora that the glands are attached above the middle, but it is not true.

Notes taken by me this year at Alta, Utah, August 17, 1893, on the type species are as follows: Petals oval, five lines long, three and one-half wide, a little cucullate by the folding of the tip of the petals which are very acute, petals concave; two glands on each petal three lines long and one-half a line wide, they run within two and one-half lines of the tip of the petal and one-half a line of the base, rounded at each end and protected by lacerate hair-like scales a line long; base of petals with stiff scales two lines long; anthers inverted, extrorse, sagittate; stigma spoon shaped, bent, single; stamens just surpassing the stigma, spreading after anthesis.

*Emmenanthe foliosa* n. sp. A close congener to *E. pusilla* and with the same habit, frequenting alkaline soil. Deep Creek, Utah, June 6, 1891, altitude 5000 feet. Minutely and rather densely pubescent and somewhat glandular; blade of leaves one-half inch long and one-third the slender petioles, irregularly laciniate dentate, lanceolate to oblong, obtuse apex rounded; leaves not fleshy, rosulate mostly; annual, much branched from the base, one to three inches high; flowers single in the forks and in loose racemes which equal the leaves and are floriferous from base of peduncle, three to five flowered; pedicels not longer than the calyx, slender; calyx a line long in flower and two lines in fruit, lobes linear and very little enlarged at apex; corolla barely lobed, yellow and almost equaling the calyx, and overtopping the oval or oval-oblong, rounded and obtuse capsule which has a very short style and is eight-seeded; seeds large,

deeply corrugated at right angles to the length and rather irregularly, no reticulations across the corrugations, or scarcely visible, seeds dark brown.

Compared with *E. pusilla* the flowers are a little larger, yellow, as long as capsule; seeds four times as large and corrugated and scarcely reticulated, while the other has seeds spirally corrugated, black, with pits almost exactly those of a honeycomb and seeds contracted at each end, the seeds of this species are narrower and less pointed; the pubescence is also different.

*Phacelia pinctorum* n. sp. Habit and general appearance of *P. micrantha*, as slender but less leafy, nearly erect, but rather widely branched, three to eight inches high, first pair of leaves ovate, long-petioled, entire, small, lower leaves simply pinnate with oblong lobes which are not widened at apex, lower petioles not margined or scarcely so and as long as the blade, uppermost leaves oblong-linear, six to twelve lines long, entire or tridentate at apex, sessile, scarcely enlarged at base; pedicels one to four times the calyx, occasionally minutely glandular, always hirsute-hispid as well as the calyx; the leaves are sparsely hirsute pubescent and not glandular; calyx lobes lanceolate or ovate, narrower at apex or acutish, equaling or twice as long as the short campanulate, white or blue corolla; appendages about one-third the distance from the base of filaments to base of lobes and in pairs; capsule globular; seeds few oblong or ovate to oval, very deeply favose, not transversely corrugated nor tuberculate; calyx enlarging.

Under pines in the Deep Creek Mountains at 8000 feet altitude, growing in situations similar to *Polemonium micranthum*, June 12, 1891.

*Gilia pentstemonoides* n. sp. Cæspitose from a much branched perennial root; leaves linear-oblancoate, acute, two inches long, densely fascicled at the summit of the root branches gradually contracted into a slender petiole, entire, rather thick, glabrous; paniculate stems four inches high, but proper stem an inch long, with short racemes arising from the axils of the scarcely smaller stem-leaves which are three to five in number; upper

stem glandular-hairy; calyx tube equaling its subulate lobes, a line long, on a slender pedicel as long; corolla blue, salverform, tube three lines long, lobes ovate or oval, one and one-half lines long; stamens and style long exserted; capsule oval, two-thirds the length of the calyx. Collected at Cimarron, Colorado, on rocks, September, 1890.

*Pentstemon confusus* n. sp. Uniformly referred by Gray and Watson to *P. acuminatus*. About a foot high, glabrous, and inclined to be glaucous; flowers open, inclined to be horizontal; pedicels one to four lines long; calyx lobes very broad, acute, with hyaline margins; corolla three-quarters of an inch long, narrow and with large lobes, narrowest in the middle, gradually enlarged above, bilabiate, veiny, red, lobes in dried specimens blue with a purple sheen; uppermost leaves not auricled, somewhat clasping, seldom ovate; small sterile filament usually glabrous; otherwise as in *P. acuminatus*. This is the same as my No. 1819 in my Utah sets of 1880. This has always been confounded with *P. acuminatus* by Watson and Gray, and is probably the plant of the Great Basin referred to *P. acuminatus*, while the other is confined to the plains of Colorado and northward and may swing westward at the north into Montana. Also collected by me at Detroit, western Utah, May 26, 1891. It frequents dry sandy slopes in the foothills.

*Pentstemon Moffatii*, Eastwood. This is what I take to be the same plant as described by Miss Eastwood in Zoe and to which I have given a name in my still unpublished manuscript. Mr. Robinson refers it to *P. albidus* with which I do not agree. As I understand that plant it is confined to the region of the plains. I find that these plants are (in my specimens) pruinose pubescent throughout and with glandular hairy inflorescence; the root leaves are oblanceolate to ovate and with a cuneate base; petiole not longer than the leaves; lower stem leaves linear-oblong to oblanceolate, with or without a clasping base; the upper leaves are broadly ovate and with an acute or acuminate apex; flowers on very short pedicels, three-quarter inch long, purple, gradually ampliate, proper tube short; sepals large, ovate to lanceolate, acute; capsule ovate and acute, longer than the

sepals. The insertion of the two pairs of stamens unequally is, so far as my field studies go now, a generic and not a specific character of which I will write more at another time. Collected by me at Thompson's Springs, Utah, on the slopes of the clay hills on May 7, 1891.

*Pentstemon deustus*, var. *pedicellatus*, n. var. pedicels two to four lines long, rarely six lines long in the lower flowers; upper peduncles obsolete; all the filaments antheriferous; flowers dirty white and veined with purple; six to eighteen inches high, almost glabrous except the pubescent corolla. Among junipers and pinons at about 8000 feet altitude on gravelly slopes of mountains. July 3, 1891, at Muncy, Nevada, and also at Cherry Creek on the fourteenth of July. Local and rather common in such places.

*Eriogonum rubiflorum* n. sp. Near *E. reniforme* but leaves oval to orbicular, almost glabrous above, densely floccose tomentose beneath, not cordate, on petioles of equal or double length, blade six lines long; loosely pilose at the nodes, branched above, six inches high; pedicels and involucre glandular-hairy; pedicels four to six lines long, usually erect or spreading, but lower ones often reflexed (in rare cases all the pedicels are reflexed); involucre fully a line long, rather deeply lobed and lobes deep blood-red, hyaline-margined; flowers a line long, red with very deep red midvein which stops short of the rounded, emarginate tip; lobes oblong, glabrous. The prettiest of the *Ganysma* group. May 28, 1891, Dugway, Utah, on the open level places at 5000 feet altitude. It is also very common in eastern Nevada in similar situations.

*Eriogonum bicolor* n. sp. Matted caespitose forming mats one to two feet in diameter from a very thick woody stem whose bark exfoliates like *Artemisia tridentata*, one to three inches high; whole plant tomentose to the glabrous perianth; leaves linear, revolute, six to eight lines long; peduncles scapose, an inch long, bearing a single rather large involucre or occasionally three; bracts minute, green; involucre two lines high, turbinate, not angled, eight-toothed and teeth short and hyaline; pedicel two lines long, erect; flowers five to ten, a line long, base hemi-

spherical and not prolonged, red; lobes orbicular and generally emarginate, white, equal or nearly so. A casual observer would take this to be a form of *E. microthecum*, but it really belongs to the *Pseudo-umbellata*. May 7, 1891, Thompson's Springs, Utah, on adobe plains.

*Eriogonum villiflorum* var. *candidum* n. var. This is by far the more common form; densely white tomentose throughout even to the flowers, not at all villous; heads very densely short peduncled. July 21, 1891, at Furber, eastern Nevada, at 6000 feet altitude, also at Glencoe, Dugway, etc., western Utah.

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#### ADDITIONS TO THE FLORA OF COLORADO—FUNGI.

BY T. D. A. COCKERELL.

The following fungi are not all new to the flora of the State, but doubtless most of them, at least, have not been recorded. The literature available to me is not sufficient to indicate precisely what has been placed on record—and had I the means, I have not the time to search the numerous publications which may contain references to Colorado fungi.

The names within square brackets after the species are those of the botanists to whose kindness I have been indebted for the identification of the specimens.

1. *Aecidium ranunculacearum*, D. C. [D. C. Fairchild]—on *Anemone cylindrica*, West Cliff.

2. *Melampsora lini*, P. [D. C. Fairchild]—on *Linum perenne* (the form I think called *lewisii*) West Cliff.

3. *Aecidium compositarum*, Mart var., *helianthi*, Burrill. [D. C. Fairchild]—on *Helianthus nuttallii*, West Cliff.

4. *Aecidium rastelioides*, E. & E. [D. C. Fairchild]—on *Sidalcea malvaeflora*, West Cliff.

5. *Aecidium compositarum*, Mart. [D. C. Fairchild]—on *Aster laevis* f. *simplex*, Cusack Ranch, Custer County.

6. *Uromyces euphorbiae*, C. & P. [Fairchild]—on *Euphorbia maculata*, West Cliff.

7. *Uromyces aconiti-lycotoni*, (D. C.) Wint. [Fairchild]—On *Aconitum Columbianum*, Cusack Ranch, Wet Mountain Valley.

8. *Puccinia atropuncta*, Pk. & C. [Fairchild]—On *Veratrum Californicum*, Cusack Ranch, Wet Mountain Valley. Other specimens on the same plant from the same locality were named *P. Veratri*, Niessl. [Galloway].

9. *Erysiphe communis* (Wallr.) Fr. [Anderson]—On *Thermopsis montana*, Cusack Ranch, Wet Mountain Valley.

10. *Æcidium thalictri*, Grev. [Anderson]—On *Thalictrum* (*Fendleri*?) Smith's Park, Custer County.\*

11. *Puccinia fusca* Wint. [Galloway]—On *Anemone patens* var. *Nuttalliana*, Cusack Ranch, Wet Mountain Valley.

12. *Æcidium astragali*, Thum. [Galloway]—On *Astragalus* (perhaps *alpinus*), near Brush Creek, Custer County, prox. 9000 feet. Also identified by Mr. J. B. Ellis.

13. *Æcidium berberidis*, Pers. [Galloway]—On *Berberis Fendleri*, near Durango, collected by Miss A. Eastwood.

14. *Æcidium compositarum* var. *ambrosiæ*, Burl. [Galloway]—On *Artemisia franserioides*, Smith's Park, Custer County.

15. *Æcidium senecionis*, Desm. [Fairchild]—On *Senecio*, Silverton, collected by Miss A. Eastwood.

16. *Uromyces junci* (Desm.) Tul. [Ellis]—On *Juncus*, West Cliff.

17. *Ustilago longissima*, Tul. [Ellis]—West Cliff, May 24.

18. *Puccinia graminis*, Pers. [Galloway]—Near Texas Creek, Wet Mountain Valley, on grass.

19. *Cronartium asclepiadeum* var. *thesii*, Berk. [Ellis]—On *Comandra pallida*, along Short Creek, Wet Mountain Valley.

20. *Tuberculina persicina*, Ditl. [Ellis]—On *Æcidium* on *Berberis Fendleri*, near Durango, collected by Miss Eastwood.

21. *Puccinia violæ* (Schum.) D. C. [Galloway]—On *Viola*, Elk Mountains, above timberline, collected by Miss Eastwood.

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\* I find, however, that an *Æcidium* from the same species of plant and the same locality was identified for me by Mr. Galloway as *Æ. sommerfeltii* Johanson.



22. *Puccinia aberrans*, Pk. [Ellis]—On *Erysimum asperum* var. *arkansanum*, along Willow Creek, Wet Mountain Valley.

23. *Oidium monilioides*, Lk. [Ellis]—On grass, near Short Creek, Wet Mountain Valley.

24. *Uromyces scutellatus* (Schrank) [Ellis]—On *Euphorbia montana*, near Short Creek, Wet Mountain Valley.

25. *Aecidium monoicum*, Peck. [Farlow]—On *Arabis*, near Short Creek, Wet Mountain Valley.

26. *Melampsora epilobii* (Pers.) Fckl. [Ellis]—teleutospores; Wet Mountain Valley.

27. *Uredo ribicola*, C. & E. [Ellis]—By Short Creek, Wet Mountain Valley.

28. *Phragmidium subcorticium* (Schrank) Wint. [Ellis]—On rose, along Short Creek, Wet Mountain Valley.

29. *Puccinia caricis* (Schum.) Reb. [Ellis]—Along Short Creek Wet Mountain Valley.

30. *Puccinia suaveolens*, Pers. [Ellis]—On *Cnicus*, near Ula, Custer County.

31. *Puccinia variabilis*, Grev. [Ellis]—On *Taraxacum officinale*, Hardscrabble District, and along Swift Creek, Custer County.

32. *Poria tenella*, B. & Cke. [Ellis]—Wet Mountain Valley.

33. *Trichoderma viride*, Pers. [Ellis]—Wet Mountain Valley.

34. *Hemiarcyria clavata*, Pers. [Ellis]—Along Short Creek, Wet Mountain Valley.

35. *Entypha subtecla*, Fr. [Ellis]—on *Populus tremuloides* Wet Mountain Valley.

36. *Odontia fimbriata*, Pers. [Ellis]—near Short Creek, Wet Mountain Valley.

37. *Nemaspora populina*, Pers. [Ellis]—on bark of Cottonwood, Cottonwood Springs, Pueblo County.

38. *Hypoxylon rubiginosum* (Pers.) Fr.—near Short Creek, Wet Mountain Valley. Identified by Mr. Ellis.

39. *Valsa nivea*, Fr. [Ellis]—on *Populus tremuloides*, Wet Mountain Valley.
40. *Hypomyces aurantius* (Pers.) [Ellis]—on *Populus tremuloides*, Wet Mountain Valley.
41. *Hypocrea richardsoni*, Berk & Mont. [Ellis]—on *Populus tremuloides*, Swift Creek, Custer County, and Los Pinos Creek basin, Saguache County.
42. *Lentinus sulcatus*, Berk. [Ellis]—Near West Cliff.
43. *Polyporus biformis*, Ketz. [Farlow]—By Swift Creek, Custer County.
44. *Polyporus arcticus*, Fr. [Ellis]—Near Swift Creek, Custer County.
45. *Polyporus arcularius*, Fr. [Ellis]—Pueblo County.
46. *Polyporus cæsius*, Fr. [Ellis]—Wet Mountain Valley.
47. *Polyporus adustus*, Fr. [Ellis]—Wet Mountain Valley.
48. *Polyporus hirsutus*, Fr. [Ellis]—Near Short Creek, Wet Mountain Valley, alt. 8400 ft.
49. *Elaphomyces variegatus*, Vitt [Ellis]—Near Texas Creek, Wet Mountain Valley.
50. *Tulostoma mammosum*, Fr. [Ellis]—Near Brush Creek, Wet Mountain Valley.
51. *Mycenastrum corium*, Desv. [Ellis]—Wet Mountain Valley.
52. *Lycoperdon lilacinum*, Berk. & Mont. [Ellis]—Near Swift Creek, Custer County.
53. *Bovista circumscissa*, Berk. & Curt. [Farlow]—Near Swift Creek, Custer County, very common.
54. *Morchella esculenta*, Pers. [Ellis]—By Swift Creek, Custer County.
55. *Coprinus ephemerus*, Bull. [Ellis]—Near Short Creek, Custer County.
56. *Lenzites sepiaria*, Fr. [Ellis]—Wet Mountain Valley.
57. *Agaricus campestris*, L.—Custer, Montrose, Mesa, and Gunnison Counties.

## BOTANICAL NOTES.

South of Monterey, along the coast there is a place that is known as Slate's Hot Springs. Mr. Slate's house is the only one, and his neighbors are remote. Behind the house a gulch extends up into the hills and along the mountain stream the redwoods, madroñas, laurels, and chestnut oaks make a deep shade. It was in an open spot in this ravine that a strange strawberry was found differing noticeably from the common *Fragaria Californica*. The petals were yellow, sepals large, peduncles erect and the brilliant red fruit had a sweet, insipid taste. Quite a patch was seen in a limited area.

Mrs. Slate explained the introduction of the stranger which proved to be *Fragaria Indica*. She had bought it from a florist and planted it in a hanging basket out of doors. The birds were attracted to the berries, and so the seeds had been distributed to two distinct localities where it seems to flourish. It may become common along the coast, and this record of its introduction will be of value in settling its origin. All well-authenticated instances of the agency of birds in distributing plants ought to be noted.

Aquatic plants are more alike the world over than any other class, and it is explained when it is remembered that water birds travel far and carry seeds in their stomachs, in their plumage, and in the soil that collects on their feet.

The common German Ivy, *Senecio scandens*, is another escape from Mrs. Slate's flower garden. It grows along the ocean cliffs where the hot sulphur springs are situated. It has become vigorously naturalized also in San Francisco along the Presidio marshes and in other places.

*Ceanothus impressus* Trel. was collected by L. Jared southwest of Guadalupe, towards Point Sal, Santa Barbara County, about fifteen years ago, and has recently been re-collected near the same place by Mrs. Ida M. Blochman.

*Prunus fasciculata* Gray is reported by Mr. Jared from the sand hills between Moro and Pecho Beach. It is reported also by Mrs. Blochman.

*Leptosyne gigantea* Kell. was sent to Harvard about fifteen years ago by Mr. Jared. It was its first discovery on the main-

land. Mr. Jared found it growing abundantly near the old wharf at Point Sal.

*Calamintha mimuloides* Benth. is reported, in the Botany of California, from the Carmel River, Monterey County. It has recently been discovered by Dr. H. E. Hasse at Acton, Cottonwood Cañon, San Bernardino Range, Los Angeles County.

A. E.

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### E. L. GREENE *VERSUS* ASA GRAY.

Edward L. Greene, Professor of botany at the State University of California, makes, in the August number of the Torrey Club Bulletin, an entirely uncalled-for attack upon the greatest systematic botanist America has produced, and as that journal has a rather restricted circulation on the Pacific Coast, the paper is here reproduced that botanists of the West may have an opportunity of judging what manner of defense Professor Greene is able to make against criticism and what weapons he is capable of using. Few will believe that this article would ever have appeared if Gray were living.

#### NEW HONORS TO OLD WEEDS.

BY EDW. L. GREENE.

The modern history of Californian botany was taken up by men who had never seen the field of their researches, and who had no conception of the number of foreign plants that had become naturalized in this part from Europe a hundred years ago. Many of these had not made their appearance in New England, and were unfamiliar to New England botanists. Several such plants, well-known to botanists in general for several centuries, obtained new names at the hands of writers of the East, as if they had been quite new to science. Dr. Britton, in the last issue of this journal, has been able to identify as old, one of my own supposed new plants; and I may here be allowed to indicate that botanists of note have added to synonymy in this manner, before me. Asa Gray, in his day, gave new names to not less than five extremely common and familiar weeds of the Old World, the specimens of which had come to him from this unsuspected habitat of California.

When, nearly twenty years ago, the present writer sent him *Convolvulus arvensis* from California, his letter in answer shows that he had considered this to be an exclusively Californian species, the *C. Californicus*, of Choisy; and when, a few weeks later, the real *C. Californicus* was transmitted, he named this *C. Soldanella*, an Old World species. But errors of this kind, of

which he and other so-called "authorities" on West American botany have made scores and hundreds, do not come directly under my heading, being errors that did not go into print. The Old World *Convolvulus* to which Dr. Gray gave a new name, as a new species, and in the wrong genus at that, is a grain field weed, as common in California as in Europe—*C. pentapetaloides*, Linn., which he named *Breweria minima* (Proc. Am. Acad. xvii. 228). This error he some years afterwards discovered and corrected. But there is one seeming more inexcusable which has not yet been corrected, though it was detected by me while Dr. Gray was still living; for I was loath to call his attention to a mistake, the discovery of which by another would naturally be somewhat humiliating. I refer to a new name that he gave to a plant of such ancient and world-wide repute as Pennyroyal, the *Mentha Pulegium* of Linnæus. In this error Dr. Kellogg, it must be admitted, led the way; for when the plant appeared to him he named it as a new *Hedcoma*, *H. purpurea* (Proc. Calif. Acad. v. 52). In working up the Labiatae for the State Survey volumes, after having examined this plant minutely, Dr. Gray simply transferred it to the Californian genus *Micromeria*, where, as he remarks, it is "anomalous;" and so it stands to-day in the Synoptical Flora, as *Micromeria purpurea*, Gray. It is abundant not only on that island in the San Joaquin River, whence Dr. Kellogg and Dr. Gray had it, but also in several parts of Middle California rather remote from that station; and not more than one species of mint, *M. piperita*, has been more familiarly known in all countries during many centuries.

A dozen years ago I found by the wayside, in Berkeley, a Cichoriacea new to me, and of which no account was given in the State Survey volumes, or in any other American book; but, suspecting it of alien derivation, I soon found it to be *Crepis virens*, Linn., one of the most cosmopolitan members of its genus. But Dr. Gray twice mistook this plant for a new species, assigning it two new names, one in each of two distinct genera. It is his *Malacothrix crepoides* (Pac. R. Rep. xii. 49), and *Crepis Cooperi* (Proc. Am. Acad. ix. 214); and it was a friendly fortune which permitted him to make this correction of a humiliating two-fold error with his own pen. Even *Malva parviflora* was by this author new-named *M. obtusa* when first it went to him from California.

I am said to have given the new name *Paronychia pusilla* to an obscure weed of Southern Europe, of which the real name is *Herniaria cinerea*. It is the only instance in which I have honored an old weed with a new name; and as I have worked upon the Californian flora now nearly as many years as Asa Gray did, my record in this respect seems not likely to prove worse than his, to say the least.

The opening paragraph of Mr. Greene's statement implies what he knows to be untrue. The identification of *Paronychia pusilla* was made in the "Botanical Writings of Edward L. Greene," published in Zoe for April. In the preparation of that

article Dr. N. L. Britton was applied to for some examples of Mr. Greene's Caryophyllaceæ, but very shortly after the letter was dispatched a fragment of *Paronychia pusilla* reached the writer from another source, and it was identifiable at a glance. Some time afterwards, and when the correction was already printed, Dr. Britton replied to my letter by saying that the plant in question was the old *Herniaria cinerea* of Linnæus, and that he had made a note to that effect for publication. The remarks of Mr. Greene on *Convolvulus arvensis* and *Californica*, for which, according to his own account, he has rifled the private letters of Dr. Gray, show a not entirely unexpected moral laxity, and a recklessness of consequences quite out of keeping with his character and which can only be accounted for by his forgetfulness of the old proverb concerning the danger of stone-throwing by one whose house is so roofed and walled and even floored by glass.

The remarks made by Mr. Greene about his discovery during the lifetime of the latter, of Dr. Gray's "inexcusable" error in transferring Dr. Kellogg's *Hedeoma purpurea* to *Micromeria* and his own magnanimity in shielding him from the "humiliating" knowledge give a pleasant surprise to those who were cognizant of the truly ecclesiastical hatred which he felt for Gray in the last three years of his life. This kind of statement should, however, be made with much caution and a due regard to the danger of the existence of proof that the "discovery" was made at a much later date. Besides, though it is extremely painful to be obliged to demolish another of Mr. Greene's "facts," *Micromeria purpurea* is not \**Mentha Pulegium* as he affirms. If he has a specimen of the latter—it is not at all so common in California as he would have us believe—one of his students will be able to tell him that *Mentha Pulegium* has the throat of the calyx closed by a villous ring and belongs to a different section from *Mentha Canadensis*. Dr. Kellogg in the original description of *Hedeoma* ? *purpurea*† says "throat naked. \* \* \* This

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\*This plant has been identified in a paper on the "Flora of Bouldin Island," Zoe, iv, 211-218. Reprint issued August 22, 1893. Dr. B. L. Robinson of the Gray Herbarium concurring after comparison of abundant material from the type locality, sent to him in 1892.

†Proc. Cal. Acad. v. 52.

plant, it may be said, cannot belong to *Hedeoma* for the throat of the calyx is not bearded. \* \* \* In the new genus *Poliomintha* Gray, the calyx still has the villous ring—this, none." Dr. Gray says "naked in the throat."\* Possibly Mr. Greene in spite of the unnecessary sneer about Dr. Kellogg leading the way, will admit that the latter's testimony as to easily observable matters of fact coming under his eyes, is trustworthy. Dr. Gray's statement is, of course, of no sort of consequence in the estimation of Mr. Greene, neither is that of the writer who examined the type two years ago in the Gray Herbarium at Harvard.

Mr. Greene says, "A dozen years ago I found by the way-side in Berkeley a Cichoriacea new to me, and of which no account was given in the State Survey volumes or in any other American book," while as a matter of fact *Crepis Cooperi* is given with its synonym in Bot. Calif. i, 436, published in 1876, and the full descriptions therein indicated are both in older American books. The only knowledge Mr. Greene has of these matters is evidently Dr. Gray's own statement in the Synoptical Flora, for in his usual second-hand fashion he copies the incorrect reference given there to the Pacific Railroad Reports.

The concluding short paragraph of Mr. Greene's article contains three distinct misstatements: (1.) *Herniaria cinerea* is not an "obscure weed," but quite the contrary. (2.) It is not the only instance in which Mr. Greene has "honored"! an old weed with a new name. He conveniently forgets *Ranunculus Biolettii*, *Alsinella ciliata*, various species of "Tissa," *Lythrum adsurgens*, *Lythrum Sanfordi* and *Biolettia riparia* though the last, to be sure, only immigrated from Texas. (3.) Mr. Greene may have "worked upon the Californian Flora nearly as many years as Asa Gray did," but if so he furnishes the world with its first example of a sucking botanist. Gray's active work on our Western botany began with The Flora of North America, 1838, and ceased only with his death in 1888. Mr. Greene was born in 1843, and made his first Californian collection at Yreka in 1876; where he was the minister of a small Episcopal congregation. His incumbency lasted for but a few months, and he soon after

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\*Bot. Calif. i, 595; Syn Fl. ii part i, 359.

left the State for some years. As a systematic botanist Mr. Greene began to write in the year 1880, and his first contribution to the literature of Californian botany was made in 1881.

Mr. Greene is most evidently of opinion that any comparison between his work and that of Dr. Gray must be immensely to the disadvantage of the latter, but there are a few things it might be well for him to remember. One of these is, that Dr. Gray's work on Western botany is essentially that of a pioneer, that he worked always under pressure, and that the great preliminary work accomplished by him has enabled a swarm of others without half his mental grasp to labor acceptably in more restricted fields, and sometimes, as in the case of Mr. Greene, to wound the kind hand which led their first weak footsteps in the determination of plants.

Dr. Gray made many errors, as must be the fate of any botanist so situated, but he never hesitated to admit and correct them, in which characteristic he differs strikingly from Mr. Greene, and he was thoroughly incapable of "covering the nakedness of his own incapacity with the mantle of another's culpability" a process in which it is to be hoped Mr. Greene will have few imitators.

K. B.

## BOTANICAL MEETINGS AT THE ANNUAL ASSEMBLY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

### SECTION G.—A. A. A. S.

The following papers were read either in full or by title:

Photography as an Instrument for recording the microscopic Characters of Micro-organisms in artificial Cultures, by G. F. Atkinson.

Symbiosis in the Roots of Ophioglossaceæ, by G. F. Atkinson.

Observations on a Rust affecting the Leaves of the Jersey or Scrub Pine, by B. T. Galloway.

Prophylla of Gramineæ, by W. J. Beal.

A new injection Needle for the Study of the Lower Plants, by J. Christian Bay.

On the Food of Green Plants, by Charles R. Barnes.

Results of some recent Work on Rust of Wheat, by B. T. Galloway.



Comparative Study of the Structure and Function of the Sporangia of Ferns in the Dispersion of Spores, by G. F. Atkinson.

The Solandi Printing applied to Botanical Work, by Byron D. Halsted.

Present Aspects of the Nomenclature Question, by N. L. Britton.

Lichens of the Black Hills, by T. A. Williams.

The Bibliography of American Botanical Literature, by J. Christian Bay.

Notes on the Development of *Marattia Douglasii*, by Douglas H. Campbell.

The fructification of *Juniperus*, by John G. Jack.

The Roots of Orchids, by M. B. Thomas.

Preliminary Notes on some Chromogenic Bacteria of the Ames Flora, by L. H. Pammel.

Further Observations on the Fermentation Tube with special Reference to Anærobiosis, Reduction and Gas Production, by Theobald Smith.

Two new and destructive Diseases of Cucurbits, by Erwin F. Smith.

Preliminary Statement concerning Botanical Laboratories and Instruction in American Universities and Colleges, by Conway MacMillan.

On the Quantitative Analysis of the Colors of Flowers and Foliage, by J. H. Pillsbury.

The minute Structure and Development of the Motile Organ in the Leaf of the Red-bud, by S. G. Wright.

The Shrinkage of Leaves in drying, by Byron D. Halsted.

Distribution of the Gramineæ in the United States, by S. M. Tracy.

A Consideration of Species based on the Theory of Evolution, by N. L. Britton.

A Revision of the Genus *Physcomitrium*, by Elizabeth G. Britton.

Deviation in Development due to the use of Unripe Seeds, by J. C. Arthur.

The principal Diseases of *Citrus* Fruits now being studied at Eustis, Fla., by W. T. Swingle.

*Cephalurus mycoidea* and *Phyllosiphon* sp., two Parasitic Algæ, new to North America, by W. T. Swingle.

An Analysis of the Conditions affecting the Distribution of Plants, by Frederick V. Coville.

A Sclerotium Disease of Plants, by P. H. Rolfs.

Notes on *Rastelia pyrata*, by L. H. Pammel.

Crossing of Cucurbits, by L. H. Pammel.

A case of poisoning by the Wild Parsnip, *Cicuta maculata*, by L. H. Pammel.

*Ulotia Americana*, Mitten, and *Orthotrichum Americanum*, Beauv., by Elizabeth G. Britton.

## BOTANICAL CLUB—A. A. A. S.

The report of the committee on nomenclature, to which had been referred the preparation of a check list, was called for and presented by its Chairman, Mr. N. L. Britton. The manuscript almost ready for the printer was presented, and the following recommendations were adopted:

"*Stability of Specific Names.*—In the transfer of a species to a genus other than the one under which it was first published, the original specific name is to be retained, unless it is identical with the generic name or with a specific name previously used in that genus"—to be amended by striking out all after the word retained.

"That the general sequence of natural orders as taken up in Engler & Prantl's 'Naturliche Pflanzenfamilien' be adopted. [Pteridophyta, Gymnospermæ, Monocotyledonæ, Dicotyledonæ.]"

"That precedence in the same volume be regarded as priority."

The report of the committee appointed last year to consider the advisability of the establishment of an American botanical society was presented by Mr. Barnes. A letter from Mr. L. H. Bailey, Chairman of the Committee, was read as virtually the report of the majority in favor of abandoning the attempt for the present. Eight of the committee thought its organization by the Club impracticable, one favored the organization, but offered no plan of procedure. Mr. Barnes, the remaining member, submitted the following:

"1.—That the Botanical Club approves the formation of an American botanical society whose membership shall be restricted to those who have published worthy work, and are actively engaged in botanical investigation.

"2.—That to this end the Botanical Club proceed to elect ten men, who beyond all question should belong to a society so restricted.

"3.—That these ten be directed to select fifteen additional members, who in their judgment fall well within the limits suggested.

"4.—That the twenty-five persons so chosen be invited to become the charter members of the botanical society, to proceed to organize the same, and to provide for the election of additional members by such methods and on such terms (not incompatible with the intent of recommendation 1) as they see fit."

The names of the first ten selected are not given, but the whole twenty-five are as follows: J. C. Arthur, G. F. Atkinson, L. H. Bailey, C. R. Barnes, C. E. Bessey, E. G. Britton, N. L. Britton, D. H. Campbell, J. M. Coulter, F. V. Coville, Daniel C. Eaton, W. G. Farlow, E. L. Greene, B. D. Halsted, Arthur Hollick, Conway McMillan, B. L. Robinson, C. S. Sargent, F. L. Scribner, J. Donnell Smith, Roland Thaxter, William Trelease, L. M. Underwood, Lester F. Ward, W. P. Wilson. "Two informal meetings of those of the above list in attendance were subsequently held," and a committee was instructed to inform the others of the twenty-five charter members of the action taken, to draw up a constitution, and to report at a meeting to be held beginning on the Monday preceding the next meeting of the American Association.

One would think that there must be a strong motive on the part of some one to form a society in the face of an adverse report of eight out of ten of the committee. That the names do not all represent the best of American botany will probably be conceded. Certainly some of those included set the standard sufficiently low that the young man who has to "win his spurs" before admittance need not grow gray in the effort. It would also be interesting to know which of the botanists honored, consented to the use of their names, and why all of the editors of the *Botanical Gazette* should be included, while the *Torrey Bulletin* is cut off with only four.

#### INTERNATIONAL BOTANICAL CONGRESS AT MADISON.

In July of the present year a call was issued for an International Botanical Congress to be held at Madison, Wisconsin, at the end of the session of the American Association for the Advancement of Science, to be held at that place. The people of the United States are never accused of undue modesty, and in so far as the originators of the movement are concerned, the American botanists have shown themselves no unworthy sons of the nation. Their "International Congress" is likely to go down into history as an ineffectual attempt by a fragment of the American tail to wag the botanical dog.

Early in the year 1892, when the subject was first broached

the editor of the *Botanical Gazette* made some remarks upon the subject which the character of the Congress renders so extremely pertinent as to make worthy of repetition.

"An International Congress of Botanists is an exceedingly valuable thing, provided it is really what the name implies. If, however, the real botanists, whom we would delight to honor, stay at home, and we have let loose upon us a crowd of quasi-botanists, such a class as is more apt to journey far to congresses than any other, our lines will not have fallen to us in pleasant places. \* \* \* The percentage of smatterers and cranks is probably as large in other countries as in the United States, and it is well-known that such classes travel further and talk more profusely than any other."\*

The Congress duly met and held three meetings. No list of the botanists present being given, we can only infer from the names mentioned that it was in no sense representative even of United States botanists. There seems to have been only one foreigner present, and that one happened to be in the country in charge of a French exhibit at the Chicago Exposition. There was no representative even from Canada or from the Spanish countries south of us. This being the case, the following resolution was adopted without discussion:

"Resolved, that, inasmuch as the attendance of European botanists at this meeting has fallen much below the expectation of the organizing committee, so that the desired international character of the assemblage has not been realized, the name of the meeting be the Madison Botanical Congress."

A committee consisting of Messrs. Bessey, Britton, McMillan, Tracy, and Davis, was appointed to nominate the officers of the meeting, and their nominees were "unanimously confirmed."

Nomenclature of plants was not discussed, it being voted "that inasmuch as the Congress did not possess the international character which had been hoped for, and could not therefore legislate upon questions of nomenclature, it should not further consider the subject."

A committee on the National Herbarium reported, pointing out "the unsafe condition of the present building in which the Herbarium is located, its unusual exposure to loss by fire, and

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\* Bot. Gaz. Feb. 1892.

the valuable character of the collections which are contained in it, and urges that steps be taken to provide an adequate and fire-proof building for its reception."

The remainder of the sessions was largely occupied by discussions on the "Nomenclature of Plant Diseases," "On the Terminology of Anatomy and Morphology," "On the Terminology of Physiology," "On the Nomenclature of Horticultural Forms," and "On Bibliography." The Congress wisely refrained from committing itself to any extent upon these questions, possibly it occurred to some of the members that the opinions and practice of European botanists might be factors in the settlement of them.

The Congress which began by electing Professor E. L. Greene for its President, ended appropriately by a vote of thanks to Otto Kuntze.

K. B.

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#### GILIA SUPERBA. PHACELIA NUDICAULIS.

Since the publication of *Plants of Southeastern Utah*, Zoe iv, 2, I have distributed specimens of the new and rare species to the principal herbariums of the country. To Dr. B. L. Robinson of the Gray Herbarium I am not only indebted for the knowledge of some errors in determination, but also for the great privilege of examining some of the types, and so I have the chance to make prompt corrections.

*Gilia superba*, described as a new species, page 122, and figured in plate xxvii, is *G. subnuda* Torr. Dr. Robinson compared this with the type.

*Phacelia nudicaulis* n. sp., page 123, is *P. demissa* Gray. This I compared with the type which Dr. Robinson so kindly lent me.

While it is to be deplored that these species are weighted with an additional name, yet the new descriptions with the field notes and plate may serve to ward off another calamity of the same nature.

ALICE EASTWOOD.

## RECENT LITERATURE.

*On a Collection of Mammals from the San Pedro Martir Region of Lower California, with Notes on other Species, particularly of the Genus Sitomys.* By J. A. ALLEN. Bull. Am. Mus. Nat. Hist., v, Author's Ed., Aug. 18, 1893, 181-202. This paper is based upon a collection of 250 specimens obtained by Messrs. Thurber and Anthony. The new forms described are *Sitomys americanus thurberi*, *Sitomys martirensis*, *Tamias leucurus peninsulae* and *Scapanus anthonyi* from the San Pedro region and *Sitomys gilberti* from San Benito County, Cal.

*The American Naturalist*, Sept. 1893. *Description of Four New Rodents from California.* By SAMUEL N. RHOADS. The four species proposed are *Sitomys major*, *S. herronii*, *Onychomys ramona*, and *Reithrodontomys pallidus*, all from the southern part of the State.

*The Prairie Ground Squirrels or Spermophiles of the Mississippi Valley.* By VERNON BAILEY. U. S. Dept. Agr., Div. of O. and M., Bull. No. 4, p. 69. Prepared under the direction of Dr. C. Hart Merriam, Chief of Division. An interesting and valuable economic bulletin, with three colored plates and four outline maps of the United States, showing distribution of species by colored areas.

*Report of the Ornithologist and Mammalogist for 1892.* By C. HART MERRIAM. U. S. Dept. Agr., 181-200, illustrated by fine colored plates of rodents.

*The Nidologist.* Published by Henry Reed Taylor, Alameda, Cal. The initial number of a sixteen-paged monthly was issued in September and the October and November numbers have also appeared. The title is not pleasing and brings into use a hybrid word which might have been avoided. The quality of several articles is far above that found in the amateur papers which appear and perish annually; but these articles are by well-known ornithologists who may not continue their support unless a stronger scientific tone is evidenced. Careless proof-reading is found in all three numbers. The half-tone illustrations are certainly interesting and perhaps as good as can be produced with

the quality of paper and press work. Illustrating birds' nests from photographs and accompanying them with descriptive notes is a large field and will take a long time to exhaust the material, but thus far the fund of new information has been but slightly added to.

*Planzenfamilien* drags itself along in an exasperating, peculiarly German style. Hoffmann in the latest fascicle of *Compositæ* completes *Cynaroideæ* and *Mutisiaceæ* and lacks only a few pages of *Cichoriaceæ*. He makes the number of genera 806. The changes of interest to Western botanists are as follows: *Cnicus* is restricted to the single species known as *Carbenia benedicta*. *Carduus* is maintained with the boundaries given by Bentham & Hooker and *Cirsium* Scop. is adopted for all the species with plumose pappus, known of late under the name of *Cnicus*. *Serinia* Raf. is substituted for *Apogon* Ell. and *Sitilias* Raf. for *Pyrrhopappus* DC.; *Microseris* is maintained in the limits of the *Synoptical Flora*, *Calais*, *Uropappus*, *Phæopappus*, *Ptilophora*, *Nothocalais*, etc., being included as sections or synonyms; *Stephanomeria* is retained and *Ptiloria* Raf. resurrected by Mr. Greene is not even mentioned in the synonymy. *Rafinesquia* Nutt. is kept up and *Nemoseris* Greene given as a synonym. In *Lieferung* 90, Taubert keeps up *Hosackia*.

*Silva of North America* vol. v.—*Hamamelidæ*—*Sapotaceæ*. By CHARLES SPRAGUE SARGENT, with fifty-four exquisite plates drawn by C. E. FAXON. Too much cannot be said in praise of this magnificent work, the plates of which with detailed dissections are nearly as useful for study as the living plant, and make one sigh for the wasted time spent over old plates in the vain endeavor to find a meaning which the artist failed to give. The only point we can suggest for improvement is that all the dissections in any given genus should be drawn from the same point of view. The plates of special interest to us in the West are *Rhizophora Mangle*, *Conocarpus erecta*, *Laguncularia racemosa*, *Cereus giganteus*, *Cornus Nuttallii*, *Sambucus Canadensis* var. *Mexicana*, *Sambucus glauca*, *Arbutus Menziesii*, *A. Xalapensis* and *A. Arizona*, raised to specific rank from a variety of *A. Xalapensis*. *Sambucus callicarpa* Greene is included in the

synonymy of *C. glauca*, but the second species *C. maritima* described from the same clump is not mentioned. Probably it was published too late to find its proper place.

The continual change of names with which we are afflicted at present has led to the printing of the text of *Ardisia Pickeringia* as *Icecorea* and the plate as *Bladhia*, and as the synonymy is given in the *Index Kewensis* there are yet two older names for someone to adopt.

*The Development of Azolla filiculoides* Lam. By DOUGLAS HOUGHTON CAMPBELL. Extract from *Annals of Botany*, pp. 155-187, with three excellent double plates.

*Index Kewensis an Enumeration of the Genera and Species of Flowering Plants, from the Time of Linneus to the year 1885 Inclusive, Together with Their Authors' Names, the Works in Which They Were First Published, Their Native Countries, and Their Synonyms.* By B. DAYDON JACKSON, Part I, A.—*Den.* 1893.\* This monument of Mr. Jackson's untiring industry is absolutely essential to every systematic botanist. The remainder is promised before the end of the next year. The only serious fault is in the matter of dates, which seem to follow no settled rule. The inconvenience is, however, more apparent than real as every botanical writer does or should verify his dates, and it would, by making it so very easy, probably greatly stimulate the practice already far too common of taking up the older names without consideration of the sufficiency of their publication. Undoubtedly errors and omissions will be found in the course of use, but the work bears evidence of great care, the only error in date so far observed by us is in *Aphantochaeta* which is given as 1856, and in "addenda and emendata" as 1836. The date on the title page of the part where it occurs is 1857. The good sense and modesty shown in refraining from coining new names, in cases where two valid species bore the same name is in refreshing contrast to the practice of Steudel and a few recent botanists tormented by an itching vanity. The species considered valid are printed in

\* The exact date is not given but a copy was mailed in London September 8, and received at the library of the California Academy of Sciences about the end of that month.



Roman, the synonyms in Italic. In this part of the work there are a good many errors, besides those which each botanist will find for himself according to his views, but although it will exactly suit no one, hardly two persons having quite the same opinions, it is on the whole probably quite as satisfactory as would be the work of any other. The lists of species are certain to be eagerly welcomed by certain of the "once a synonym always a synonym" botanists as furnishing opportunity for unlimited changes.

K. B.

*Transactions of the San Francisco Microscopical Society, Part I.* This first part of the publications of the Society is largely historical, the exceptions being interesting articles by Dr. D. W. Montgomery on *Molluscum contagiosum*; Marine Fossil Diatomaceæ from California, and their Zoology, by Dr. A. M. Edwards, and the Santa Monica Diatomaceæ by Henry C. Hyde. A catalogue of its excellent microscopical library is supplied as well as a list of the members, which embraces the names of men who are able to and should do much good work.

K. B.

*Erythea* for September contains an article by Willis L. Jepson on the expedition of La Perouse which visited California in 1786. It is well to refresh occasionally our remembrance of the early navigators, even in cases where their contributions to science were from various causes but slight. Mrs. Ida M. Blochman contributes a paper of interest on "Californian Herb-Lore." Professor Greene furnishes an article on the distribution of some western plants in which he tries to prove that our *Madia sativa* is divisible into three species. His "vernal" and "æstival" periods of flowering will be found quite as unreliable as they are in *Madia elegans*. To save himself further trouble and to satisfy the anxiety of the student whom he quotes he might compare *Lepidium Menziesii* Nutt. with *L. bipinnatifidum* Desv. so generally diffused in South America.

The October issue contains a number of West American fungi by Ellis & Everhart, more than half of them in "genera" which are known to be but forms of other genera. Corrections in Nomenclature iii, by Edward L. Greene, on the principle of "once a synonym always a synonym" furnishes new names,

"Forsellesia" and "Bourdonia" for the genera known to us as Glossopetalon and Keerlia, of course with transference of the species as well as genera to the credit of the author. The third instance, more aggravated than even the first two is the transference of Calycanthus L. to Butneria Duhamel, which if adopted would lead to the changing of the large Sterculiaceous genus Buettneria. No species was ever named under Duhamel's Butneria, and Mr. Greene fails to inform us how he succeeded in satisfying himself that it had priority over Beureria Ehret published in the same year, and taken up by Kuntze. *Lotus sulphureus* and *L. tomentosus* are supplied with new names, the author's attention having been called in Zoe for April to their previous use, but *Lotus macranthus* is still unchanged. *Astragalus campestris* Gray is changed to *A. convallarius* Greene because of *A. campestris* L.—now known as *Oxytropis campestris*, and *A. pectinatus* Boiss., a Syrian species is to be called *A. elegantulus* Greene, though the author has not the least idea whether it is a valid species or not. The remainder of the pages are occupied with the doings of American botanists at Madison, which are discussed elsewhere.

The November number under *Novitates Occidentales* describes seven new species of which, waiving for the present the question of their value, *Astragalus demissus* Greene, is a homonym of Boissier's species published in 1849 in Diagn. Pl. ser. i, No. 9, page 50, and *Saxifraga umbellata* Greene bears the same relation to a species of, Hooker & Thompson Journal Linnæan Society, ii, (Bot.) 71 (1858). We note for most of the species the usual vagueness of station; Mr. J. G. Lemmon gives some notes on *Pinus insignis* and *P. tuberculata*, which he would have called respectively *P. radiata* Don and *P. attenuata* Lemmon; Mrs. Blochman continues her interesting Herb-Lore notes; and Mr. Greene laments over Baron von Müller's comments on Polanisia which "show that he wholly misapprehends the characters on which Rafinesque's Jacksonia is based, though we have twice announced them very distinctly in Pittonia."

K. B.

*Revisio Generum Plantarum* Part III. By OTTO KUNTZE. So far as this part is concerned the title is a misnomer. It is

principally occupied by extracts from Kuntze's reviewers and his own comments on the extracts. Only these last are of much interest, most botanists having already read the criticisms in whole or in part. The notes by Kuntze thereon show a great deal of bitterness against unfriendly reviewers and a profusion of abusive epithets which by withdrawing attention from the argument do harm instead of good. He argues throughout from a legal point of view, taking the position that all botanists should be firmly bound by the Paris Code, until that code itself shall be rejected or altered by a thoroughly representative congress. In this light his arguments are fairly consistent, but it is a fact which no one can deny that quite a number of influential botanists did not fully agree at the time with the Paris Code, and that the practice of many others has diverged quite widely from it. So far in the world's history a law is respected in direct proportion to the power for its enforcement. At present this power does not exist, and can only come by organization and the election of delegates who shall represent all botanists and be able to make rules acceptable to the greatest number.

The numerous signs proposed for use in an international system of botany would be a tax upon memory which most botanists would find very wearisome.

The last thirty-three pages are occupied by a "*Codex Nomenclaturæ Botanicæ emendatus ab. Otto Kuntze*," printed in parallel columns in German, English, and French. It is founded on the Paris Code, but with many alterations often to its improvement. A few extracts will serve to show the spirit of these:

"New names based on synonyms are sufficiently characterized by the synonyms" [but in such cases the synonyms should always have been well characterized].

"A deviation from strict priority is necessary for genera published on the same day and united afterward." (The genus first receiving species after 1753 to be valid.)

"The annulments and alterations of the existing laws shall have no retroactive force and shall be applicable only to new or subsequently renewed denominations after the date of the publication of the resolution concerned passed by the competent

congress. Names before that date shall be entitled to admission."

"Names of genera or species or varieties which after 100 years since their establishment have not been renewed by other botanists shall be prohibited to be renewed in the future" [half that time would seem to be quite sufficient].

"Existing homonyms invalidate such homonyms as are in future competitive or newly established or renewed." [The author has no patience with the "once a synonym always a synonym" rule as a retroactive measure.]

It plainly appears from the above that the author is not without some sensible ideas. It is evident, however, that he needs an English editor in spite of his conviction to the contrary, and the following clause is so extraordinary that it seems hardly possible it can have emanated from a sound mind.

"*Transitory Article.* The generic names proposed by Dr. Otto Kuntze for the new starting-point of nomenclature shall be valid according to the former articles, 1-68. The species-names thereto, as may be found in his *Revisio generum plantarum*, shall be combined with his proposed acceptable genera, and the combinations of all such names shall be provided with his responsible author's quotation.

"Any editorial alterations shall be reserved to Dr. Otto Kuntze, subject to the consent of the next congress." K. B.

REVIEWS BY THEO. HOLM.

B. RENAULT: *Lycopodiopsis* gen. nov. an arborescent *Lycopodiaceus* plant.\*

The present paper is based upon material from the carboniferous formation in Brazil, collected near Piracicaba in the province Santo Paulo.

While these specimens showed several features in common with the genus *Lycopodium*, the author has observed some divergences, which have seemed to make necessary the establishment of a new genus "*Lycopodiopsis*." It might be noted, that this plant occurred with some Conifers, Cordaites, Praronius and

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\* Notice sur une *Lycopodiacee* arborescente du terrain houiller du Brésil. (Société d'hist. nat. d'Autun. Vol. 3. p. 109-125.)

relics of a reptile, the *Stereosternum* of Cope. The material consisted of some fragments of a stem, which showed numerous scars from leaves in dense spirals. A transverse section was also obtained of the stem itself; but no organs of fructification were to be found.

The author compares the shape and the arrangement of the leaf scars of this plant with those of others from the same formation, such as *Praronius*, *Lepidodendron*, *Lepidophloios* and various representatives of the *Sigillariaceæ*, and finds a certain accordance to those of the *Lycopodiaceæ*. A similar study has been made of the anatomical structure of the stem, which in several respects does not correspond to that of a *Lycopodium*. This is for instance well marked by the presence of a distinct pith in the Brazilian plant, besides that the mestome-bundles are moved towards the periphery. It might also be objected for the identification of our plant as belonging to the *Lycopodiaceæ*, that there is a considerable cork developed. But we might, on the other hand, take into consideration, that during the carboniferous period the trees showed constantly a heavy layer of this tissue on account of their exposure to frequent changes of dry or moist atmospheres.

Two species of *Lycopodium* are known from the same formation namely *L. punctatum* B. R. and *L. Renaulti* Brongt., but the author has preferred, as stated above, to consider this plant as representing a new genus *Lycopodiopsis*, species *Derbyi* B. R.

H. ENGELHARDT: *Cretaceous plants from Bohemia*.\*

The comprehensive studies of Velenovsky upon the cretaceous flora of Bohemia have already called attention to the numerous interesting types, that occur in this flora. It was, especially, these previous works, that induced the author of the present paper to study a collection of plants from the same formation in Bohemia, which had not been examined by Velenovsky. Several species are enumerated in this note and the author gives a very complete synonymy of each species with references to the litera-

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\* Ueber böhmische Kreidepflanzen aus dem Geologischen Institute der Deutschen Universität, Prag. (Mitteilungen aus dem Osterlande, Vol. 5, New Series, Altenburg i. S.—A. 1892, p. 86. One plate.)

ture, besides describing and figuring some species, which are considered as new to science. These are as follows: *Sphærococcites Laubei* of the Algæ, *Litsæa bohémica* of the Lauraceæ, *Proteoides Reussi* of the Proteaceæ and *Callistemophyllum Bruderi* of the Myrtaceæ.

The ferns are represented by the genera *Mertensia*, *Thyrsopteris*, *Pteris* and *Asplenium*. Seeds were found of *Cycadeospermum*, by the author referred to a new species *C. turonicum*, while *Sequoia*, *Widdringtonia* and *Pinus* were among the Conifers. The dicotyledons were represented by species of *Ficus*, *Laurus*, *Dryandra*, several interesting species of *Aralia*, besides *Hedera*, *Credneria*, *Magnolia*, *Bombax*, *Sterculia* and *Eucalyptus*.

H. B. GEINITZ: *The fossils of Sachsen-Altenburg*.\*

Animals and plants are enumerated in this paper as they have been discovered in the various geological formations of Sachsen-Altenburg. We will merely consider the plants, of which specimens are noted from the Devonian to the Tertiary formation. *Chondrites* and *Harlania* are mentioned from the Devonian, *Calamites* from the Carboniferous, *Palaeophycus*, *Sphenopteris*, *Ullmannia* and *Voltzia* from the Zechstone-formation, while a considerable number have been noted from the Tertiary and the "Braunkohl" layers. Among these are a few *Cryptogames* namely *Sphaeria* and *Lygodium*, some Palms and Conifers, the last of which are placed under *Dicotyledones*! It may be noted at the same time, that the *Najadaceæ* are enumerated under the same group, the *dicotyledoneous* plants, and that *Nyssa* is placed under *Santalaceæ*, which misprints seem to have been overlooked.

The number of species is relatively very small, although several of the large genera have been discovered, such as *Quercus*, *Ficus*, *Eucalyptus*, *Juglans* and *Carya*.

B. RENAULT: *Retinodendron Rigolloti* nov. gen.†

It is a marked characteristic of the plants from the permo-

\* Die Versteinerungen des Herzogtums Sachsen-Altenburg. (Mitteilungen aus dem Osterlande, Vol. 5, New Series, Altenburg i. S.—A. 1892, p. 161.)

† Sur un nouveau genre de tige permo-carbonifère, C. G. *Retinodendron Rigolloti*. (Comptes Rendus hebdom. d. séances de l'Acad. d. sc. Vol. cxv. Paris, 1892 p. 339.)

carboniferous formation, that they possess reservoirs of tannin or various mucilaginous matters, besides resiniferous ducts in great abundance. This is the case for instance in *Sigillaria*, the bark of which shows numerous secreting ducts; in the petioles of *Myelopteris* which are almost perforated by gum-ducts; in the leaves and branches of the *Dolorophylleæ*, where each mestome-bundle is accompanied by numerous ducts; and in the outermost layers of the bark in *Colpoxylon*, *Medullosa* and *Cycadoxylon* which show the presence of a very large number of gum-reservoirs. Such examples might easily be multiplied. A very interesting addition to this flora of the permo-carboniferous formation is the new genus *Retinodendron*, which the author describes in the present paper.

The material, upon which the genus has been established, was collected near Autun, in France, by Mr. Rigollot. It consisted of a stem, of which only the inner part was preserved; the bark was, unfortunately, wanting. The author succeeded, however, in identifying the family to which this stem belonged, and he has referred it to the *Gymnospermæ* on account of the structure of the hadrome.

The leptome showed the singular fact, that certain parts were composed of several concentrical zones of gum-ducts and sclerotic cells in regular alternation with each other. The content of these gum or probably resin ducts was a brown and somewhat granular substance. The ducts themselves were surrounded rounded by a sheath of thin-walled cells, around which another sheath was formed of similar cells, the walls of which showed some kind of irregular perforation. This first zone of gum-ducts included about fifteen concentrical rows, but outside this was a second zone, consisting of twenty-four rows of similar ducts; thereupon followed a circle of sclerotic cells, after which again a third zone of more than fifty concentrical layers of the same gum-ducts, as described above.

This very regular arrangement of the ducts and sclerotic cells reminds one of the *Poroxyleæ*; but in the latter it is the sieve-tubes and parenchymatic cells, which show this regular arrangement.

B. RENAULT: *The Botryopteridae*.\*

The representatives of this family are especially characterized by the leaves, which usually are destitute of any blade, and the organs of fructification are therefore to be found at the apex of the nerves, thus resembling the species of *Thyrsopteris* and *Osmunda*. The sporangia are large, 2 mm. in length, their form varying from oblong to pyriform, or sometimes semilunar, circular, or polyëdric; their membrane consists of two distinct layers of different structure. The spores are present in large number, and show various forms, some being round with smooth surface and showing the three radiating lines, which are characteristic of the macrospores; some others are polyëdric, but have not the radiating lines.

These plants seem to have been herbaceous or frutescent, and to have grown in the water, sometimes even submersed. They resemble *Osmunda* in regard to their habit, but they seem, however, to represent a family, which is well distinguished from the ferns. It is a family that existed already in the Permian-formation, and the numerous specimens which have been obtained were so well preserved as to enable us to establish several genera. These genera are based upon the various forms of the mestome-bundles of the rachis, considered in transverse sections. Following forms are to be distinguished: The "sword-shaped" in *Clepsydropsis*, the "H-shaped" in *Zygopteris*, the " $\omega$ -shaped" in *Botryopteris* (showing a form like the Greek letter  $\omega$ ), and finally the "linear" in *Grammopteris*. The name "*Botryopteris*" does not indicate the corresponding form of the mestome-bundles as in the other genera; the name has been chosen from the fact that this genus was the very first one in which were observed the large sporangia, united into voluminous masses and botryoidally arranged. The author gives, also, a very complete description of these genera and their respective species.

M. MÖBIUS: *Australian fresh-water Algæ*.†

This paper is based upon a collection of fresh-water Algæ which were collected by Mr. Bailey near Brisbane, in Australia;

\* Note sur la famille des Botryoptéridées. (Société d'hist. naturelle d'Autun, Vol. 4. p. 349-373.)

† Australische Süßwasseralgen. (Flora, 1892. p. 422-450. 22 figs.)



it includes Florideæ, Chlorophyceæ and Phycochromophyceæ, while the Diatomeæ have not yet been identified. The author calls attention to the fact that no species was observed of the genus *Cladophora*, although *Cl. gossypina* Kütz is reported from Adelaide, and *Cl. Wollsi* Sond. from the Parramatta River. It is also strange that the Characeæ were entirely absent, since this family is very well represented in New Zealand according to Nördstedt. \*

Four species are described and figured as new to science: *Coleochaete Baileyi*, *C. conchata*, *Stigeoclonium australense* and *Scytonema subtile*, besides a number of new varieties. The paper contains many critical notes and gives the geographical distribution of all the species in question.

F. HEYDRICH: *Algae from New-Guinea*.†

A large collection of salt-water Algæ from New-Guinea, made by Capt. Schneider in the year 1891, has been identified by the author, who enumerates the species in the present paper. Several species of Cyanophyceæ, Chlorophyceæ, Phaeophyceæ and Florideæ are enumerated, and additional notes are given as to the literature and the geographical distribution of the species. The following are described and illustrated as new to science: *Oscillaria microscopica*, *Ectocarpus elachistiformis*, *Streblonema minutula*, *Zonaria parvula* Grev. var. *duplex* and *Bostrychia crassula*.

G. DE LAGERHEIM: *Trichophilus Nenie*.‡

It is a fact of great interest, that certain Algæ live exclusively upon live animals. Some of these are true parasites and very injurious to their hosts, while some other ones are merely epizoid. To the last category belong for instance: *Cladophora ophiophila*, which grows upon Herpeton, *Characium* upon Entomostraca, *Cyanoderma* upon *Bradypus*, etc. The author has, however, discovered a species of *Trichophilus* growing

\* Australasian Characeæ. Berlin, 1892.

† Beiträge zur Kenntniss der Algenflora von Kaiser-Wilhelms-Land (Deutsch-Neu-Guinea.) (Berichte d. deutschen botan. Gesellsch. Vol. x, Heft 8, Berlin, 1892, pp. 458-485, 3 plates.)

‡ *Trichophilus Nenie* Lagerh. n. sp. eine neue epizoische Alge. (Berichte d. deutsch. botan. Gesellschaft, Vol. x, Heft 8, Berlin, 1892.)

upon the shell of *Nenia*, where it formed deep-green spots and was very conspicuous. This species, which shows several differences from *T. Welckeri*, hitherto the only known species of this genus, is described as new and named *T. Nenie* Lagerh; it was collected in Ecuador.

It seems more than probable that the occurrence of these Algæ upon living animals is a matter of protection; we remember for instance the numerous constellations that occur on the bottom of the sea, where Crustacea: *Hyas* and others are walking around, covered with a whole forest of Algæ, Hydrozoa, etc., so that the *Hyas* itself is hardly visible.

G. DE LAGERHEIM: *The glacier-flora in Ecuador.\**

The summits of all the higher volcanoes of Ecuador are covered with snow, which persists through the summer. This snow is hard like ice, but is, nevertheless, inhabited by a flora, of which the author gives a very interesting sketch in the present paper. It was especially some earlier investigations upon the same flora, but from collections made in the arctic region, which induced the author to secure material from the volcanoes in Ecuador; these earlier studies were made by Berggren and Wittrock, and by the author himself.

The material was collected upon the snow, which showed the well-known phenomenon of having a deep pink color, the so-called "red snow," and the author enumerates several cryptogames, especially Algæ, as representatives of this singular vegetation.

*Chlamydomonas sanguinea*, *C. asterosperma*, *C. glacialis*, *Raphidonema nivale*, *Selenotila nivalis* are described and figured as new, and the species of *Chlamydomonas* were the most frequent forms in the red snow. Some other genera were also represented, as for instance: *Bichatia*, *Nostoc*, *Navicula*, *Mesotænum*, *Gloeocystis* and others. Of Fungi were observed *Chytridium* and the new genus *Selenotila*, while *Philodina roseola*, which occurred together with the red *Chlamydomonades*, was the only representative of the animal kingdom.

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\* Die Schneeflora der Pichincha. Ein Beitrag zur Kenntniss der nivalen Algen und Pilze. (Berichte d. deutsch. bot. Gesellschaft, Berlin, 1892. Vol. 10, Heft 8, p. 517.)

## NOTES AND NEWS.

Mr. O. T. Baron, whose collection of humming-birds has been placed in the museum of the Hon. Walter Rothschild, has again started for South America for the purpose of making collections of small birds, mammals, and insects.

A new publication, *Novitates Zoologicae*, is to appear from the museum of the Hon. Walter Rothschild, Tring, England, in January, 1894. It will be issued in parts at irregular intervals during the year, making an annual volume of 400 to 600 pages.

Mrs. Katharine Brandegee, returning from Baja California, with the botanical and zoological collections made by Mr. Brandegee and Dr. Eisen during the month of September, was shipwrecked off the coast of California, near San Pedro, in a dense fog, on the night of October 14th. The collections escaped injury.

In the course of a review of *Index Kewensis* by the editor of the *London Journal of Botany*, some remarks are made which may be of use in helping us to "see ourselves as others see us." "The aim is to record every genus and species of phanerogams published before the end of 1885—a date which, fortunately for the compiler, precedes the eruption of neo-American nomenclature, which is still raging almost unchecked." "His care throughout has been to avoid the necessity of causing himself to be cited as the authority for any combination of names; and in this he contrasts favorably with too many modern writers, especially in America, whose often ill-considered resuscitation of disused names seems to have been actuated by a 'desire to obtain a cheap notoriety by making new combinations.' Changes of nomenclature on a large scale should be left to the monographers of genera, and Mr. Jackson has acted with judgment as well as with modesty in not attempting them."

The genus *Agoseris* Raf. into which the species have all been transferred from *Troximon* both by Professor Greene and by Otto Kuntze, appears to have been taken up before. The *Kew Index* cites as synonyms of species of *Troximon*, *A. cuspidata*

Steud., *A. glaucus* Steud., *A. parviflora*, *rosea*, & *taraxacifolia* D. Dietr.

*HALESIA* L., a genus of three species inhabiting the south-eastern United States, is now undergoing the miseries of nomenclatural reform. There was a *Halesia* Browne, published four years earlier than the one of Linnæus, and although the earlier one is only a synonym of Guettarda, it is raked out of its grave in order to destroy by the "once a synonym always a synonym" process the commonly and long-accepted *Halesia* of Linnæus.

Dr. N. L. Britton, noting the opportunity, in "Garden and Forest" for October 18 inflicts the name "*Mohria*" on a suffering science, as a substitute for *Halesia* L. and duly transfers the species.

Professor Greene, in his Journal "Erythea" of November 3, with his customary happy knack of making every possible blunder, accuses Professor C. S. Sargent of creating the name "*Mohria*" and proposes "*Carlomohria*" as a substitute, "vouchsafing" the information that "*Mohria*" as a spoken name is identical with "*Morea*," a name already twice employed.

In the meantime Dr. Britton having discovered that there is a recognized "*Mohria*" among the genera of ferns, invents a new generic name "*Mohrodendron*" and in Garden and Forest, November 8, again transfers the species.

*Halesia* in this way has been "honored" in three weeks' time with three new generic names and two sets of binomials, which the botanical world will promptly add to the "ever increasing store of silent synonyms."

"MR. JACKSON'S great *Index* continues to progress steadily and with as much rapidity as the nature of the work will allow. It is now printed off as far as the beginning of E; up to the end of D it occupies 807 quarto pages of three columns each."—*Lond. Journal of Botany*, March, 1893.

"Part I of the *Index Kewensis*, dealing with the nomenclature of all known flowering plants, has just been issued in London. It had been confided that such a work was in progress at the Kew Herbarium, and the promise of its publication excited

curiosity and interest in many quarters."—*Erythea*, August 1, 1893.

"Professor E. L. Greene tells us, in *Erythea* for August, that 'Part I of the *Index Kewensis* has just been issued in London.' We in London have not yet heard of the publication of Mr. Jackson's great work, with the progress of which the readers of this Journal have been kept tolerably well acquainted."—*London Journal of Botany*, September, 1893.

"At least as early as the tenth of July, 1893, a prospectus was circulated in London announcing as 'just ready' Part I of the long-expected *Index Kewensis*. As a matter of fact it was not ready. The prospectus was, however, shortly on its way to America, and the August number of *ERYTHEA* announced in 'Notes and News' the publication of Part I of the work. This was contradicted in the *London Journal of Botany* for September, and we were further informed that the readers of that journal were kept tolerably well acquainted with the progress of the *Index*. We were left to infer that the *Index* was not out; was not even expected, for the prospectus seems not to have been heard of there. Another month passed. The October number of the journal reviewed the *Index Kewensis*, Part I. The prospectus had finally come to the light of the astute London editor, and its premature circulation was set down as a fault of Kew, and not due to any creative imagination on the part of the editors of *ERYTHEA*. \* \* \* Furthermore the editor, in his eagerness to locate responsibility for news notes in *ERYTHEA* does not guess at all well. He should confine himself to berating the Kew people, which is his forte.—W. L. J."—*Erythea*, November 3, 1893.

The second part of the *Index Kewensis* has been passed for press and may be expected very shortly. This concludes the first of the two volumes and brings the enumeration down to the end of J (*Justicia*). So far the work occupies 1268 pages.—*Lond. Jour. Bot.*, November, 1893.

The editor of the *London Journal of Botany* in the course of a caustic notice of Conway McMillan's "*Metaspermæ*" makes some remarks which do more than justice to the neo-American reformers. He says: "The 'Botanical Club of the American

Association for the Advancement of Science' has decided otherwise; to such an authority even Mr. Macmillan, albeit reluctantly, must needs bow; and *Taraxacum Taraxacum* with its numerous analogues passes into that limbo which is largely peopled by the unhallowed creations of American reformers. With these go a large number of galvanized corpses \* \* \* for the Botanical Club, which shows distinct signs of sanity in its mode of dealing with these questions, accepts 1753 as the date for genera." The editor will be obliged to retract some of his belief as to the Club's glimmerings of sanity, for at the last session it rescinded its previous action concerning double names and indorsed Mr. McMillan's practice.

Concerning *Jacksonia* he says: "*Jacksonia* of Rafinesque is one of Professor Greene's numerous restorations, and with his usual promptness in enriching nomenclature he at once ran out four species, but *Jacksonia* has since received its *coup de grace* from Dr. Britton \* \* \* We may be thankful that Dr. Britton's exposure came in time, as I believe it has done, to prevent the substitution of a new name for the well-known *Jacksonia* of Brown." The editor has herein done gross injustice to Professor Greene in underrating the alacrity with which he seizes such opportunities. "Erythea" for May, 1893, contains a list of thirty-six species, all except the first one transferred from *Jacksonia* to *Piptomeris* and credited to himself.



# ZOE

## A BIOLOGICAL JOURNAL

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VOL. IV.

JANUARY, 1894.

No. 4.

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### NOTES ON A COLLECTION OF MAMMALS FROM THE SIERRA NEVADA MOUNTAINS.

BY WILLIAM W. PRICE.

In the summer of 1892 the writer made a trip into the higher Sierra Nevada Mountains, during which he secured for the Leland Stanford Jr. University the small collection of mammals on which the following notes are based. The collecting was done chiefly in three different localities; namely, at Red Point and at Summit Station, in Placer County, and on Mount Tallac, in El Dorado County.

The topography of the country, hastily sketched, is as follows: Red Point is at an altitude of about 4500 feet, on the Forest Hill Divide—a tongue of land lying between the North and Middle Forks of the American River. Heavy forests of sugar and yellow pines, fir, spruce, and cedar clothe the ridges; the undergrowth is composed chiefly of several species of *Ceanothus*, manzanita, and scrub oak.

The open, brushy tracts on the top of the ridge are the favorite haunts of the long-eared chipmunk, *Tamias macrorhabdotes*. The California ground squirrel, *Spermophilus grammurus beecheyi*, which has here about reached its vertical limit, is common on rocky hillsides. Two other squirrels, the California gray squirrel, *Sciurus fessor*, and the California chickaree, *Sciurus hudsonius californicus*, are found everywhere in the timber though preferring deep hillside forests.

Summit Station, the highest point on the Central Pacific Railroad, is about 7000 feet above the sea. On the east the mountains descend abruptly toward Donner Lake, but westward the slope is much more gradual. A broad, grassy valley, the head waters of the Yuba River, takes its rise

December 21, 1893.



at the summit. The chief timber is the tamarack pine, *Pinus contorta*, which still forms heavy forests along the sides of the valley though much of it has been cut away since the coming of the railroad. On the high ridges, a thousand feet above the valley, are found scattering groves of a beautiful fir, *Tsugo Williamsonii*. Along the stream which wanders through the valley grow thickets of a dwarf alpine willow and alders; often about these in the grass were runways of meadow mice or voles. It was in this valley that I first found the curious alpine spermophile, *Spermophilus beldingi*. The gilded chipmunk *Spermophilus chrysodeirus* was also abundant in the rock ledges.

Mt. Tallac, about which the greater part of the collection was made, is nearly 10,000 feet in altitude and lies a few miles southwest of Lake Tahoe. The western slope is not precipitous like the eastern side, and is well timbered in places, chiefly with tamarack pine, a few groves of Williamson's fir and *Pinus flexilis*, the latter a dwarf snow-crushed pine, bearing five leaves and small purple cones, and found only on the highest peaks and ridges. There are many boggy springs along the mountain slope, about which flourish alder and willow thickets. It was in these places that I found the only traces of the weasel, *Putorius arizonensis* (?). Several mammals, including the gray-headed pika, *Lagomys schisticeps*, the yellow-bellied marmot, *Arctomys flaviventer*, and two or three species of *Tamias*, were found commonly high up among the rocks.

From Mt. Tallac I made a hasty three days' trip into the Carson Valley, Nevada, obtaining there specimens of *Arvicola* and *Tamias*. A large hare, *Lepus texianus*, and the antelope squirrel, *Spermophilus leucurus*, were common on the sage plain east of the valley; along the eastern base of the Sierra Nevada I saw several specimens of a large bushy-tailed spermophile which was probably *Spermophilus grammurus*.

I failed to obtain specimens of many common species, either through lack of time or accident; these species with others commonly known to the trappers will be enumerated at the close of the list. I have taken advantage of the identification by Dr. J. A. Allen of some of this material submitted to him by the Museum, and I am also greatly indebted to Prof. C. H. Gilbert and

Mr. W. E. Bryant for aid of various kinds in the preparation of this paper. The numbers used throughout the paper are the serial numbers of the mammal collection in the University Museum.

1. *Tamias quadrimaculatus* Gray.

This species, of which six specimens were taken, was found only at two localities, Summit Station and on Mt. Tallac. They are all in worn pelage, having not yet attained their fall coat, but all show on the flanks, patches of rich ferruginous that cannot be mistaken. The series varies somewhat in intensity of color, although they were all collected within a period of three weeks. Two specimens, No. 51, a male, taken July 31, and No. 97, a female, taken August 12, on Mt. Tallac at about 8500 feet elevation show the highest coloration. In one specimen, No. 66, a male, nearly all the outer coat has been shed, leaving the soft black under pelage, through which the new hairs of the stripes are beginning to show.

Little is known of either the horizontal or vertical distribution of this species. It is considered by Dr. Allen a Sacramento Valley form, and is recorded from the following localities: Nevada City, Nevada County; Fort Crook, Shasta County; Baird, Shasta County; Mt. Shasta, Lassen County; and from Fort Klamath, Oregon. As is readily seen, none of these localities are in the Sacramento Valley. They are all in the lower portion of the pine belt which covers the western slope of the Sierras down to an altitude of about 1500 feet in the Mt. Shasta region and to about 2500 feet in Central California. The discovery by the writer that *Tamias quadrimaculatus* inhabits the upper slopes of Mt. Tallac was unexpected, and goes to show that from Nevada City northward this species probably inhabits the entire western slope of the Sierra down to the limit of evergreen forests. Its extension southward is still unknown.

Gray's type of *Tamias quadrimaculatus* came from Michigan Bluff, which stands at an elevation of 3500 feet, some fifteen miles in a direct line due south of Blue Cañon, and about half that distance from Red Point. The three localities present similar conditions, standing at approximately the same elevation, and all included in the great belt of yellow and sugar pine.

When it is recalled that at Red Point and Blue Cañon, *Tamias macrorhabdotes* only, seems to occur, it appears probable that this is the only species, or at least the most abundant one to be found at Michigan Bluff also. In connection with this we have the fact that neither in the original description of *T. quadrimaculatus*, nor in Thomas's later notes to Dr. Allen concerning the type specimen, is there anything characteristic. It is thus seen that Dr. Allen's first impression that Gray's species should be identified with *T. macrorhabdotes* has the probabilities greatly in its favor. Until the original type is more critically re-examined, or until Michigan Bluff is explored, it may be as well to follow Dr. Allen in identifying *T. quadrimaculatus* with the species here so designated.

2. *Tamias macrorhabdotes* Merr. Long-eared Chipmunk.

Eleven specimens taken in the neighborhood of Red Point are all distinctly referable to this species, and show but little variation. All were taken in late June or early July and are in breeding pelage. Several of the females were nursing and one or two contained small embryos.

The long-eared chipmunk is pretty well distributed on the Forest Hill Divide, and chipmunks supposed to be of this species were seen at altitudes varying from 3000 to 5500 feet. On top of the Divide a mile or two from Red Point is a fire-swept stretch of woods, with charred bushes and logs and trees both living and dead. The soil is a rich sandy loam supporting many species of flowering plants. In this locality the long-eared chipmunk is especially abundant. Sometimes a dozen could be seen at once playing on the logs and charred trees or scratching in the dust. My observations confirm those of Mr. C. A. Allen, who says that this animal is almost exclusively terrestrial, and that if it is surprised while on trees it will try in every way to reach the ground unseen and hide in holes or rubbish heaps. I have often seen it high up on trees, where it very skillfully reached the ground without being seen by descending the opposite side. It has the usual shrill note of alarm, somewhat louder than those of other species I have met.

3. *Tamias senex* Allen. Gray Chipmunk.

Three specimens of this chipmunk captured on Mt. Tallac

were the only ones secured. They were taken at a little over 7500 feet elevation, among bushes and granite boulders along the western slope of Mt. Tallac. I do not remember seeing any at Summit Station, the type locality of the species, but several large gray chipmunks were seen at the foot of Donner Pass, along the western end of Donner Lake. Their size was noticeably greater than that of the smaller chipmunks, *amœnus* and *frater*, which I had been collecting on the summit.

Of three specimens two are adult females collected August 4 and 12, apparently just beginning to moult. The other, taken August 12, is a young male, nearly full grown and somewhat richer in coloration.

4. *Tamias amœnus* Allen. Klamath Chipmunk.

Of the seven specimens of *Tamias* referable to this species, three were taken at Summit Station and four on Mt. Tallac. They are mostly in ragged pelage, and some seem to approach *Tamias frater*, though in all the specimens the pale buff base of the hairs on the upper surface of the tail is enough to distinguish them easily.

This is the smallest species of *Tamias* collected in the Sierra Nevada; two specimens, No. 58 ♂, and No. 62 ♀, were collected on bare rocks on Mt. Tallac, at 9500 feet elevation. It was found on trees, on the ground, and among rocks. Numerous small chipmunks were seen on a rocky, scantily-wooded hillside some miles west of Summit Station and at about 1000 feet lower altitude, but as no specimens were taken, they might have been either *amœnus* or *frater*.

5. *Tamias frater* Allen. Sierra Nevada Chipmunk.

Seven specimens of this form were taken, five at Summit Station and two on Mt. Tallac. These, like most of the other chipmunks collected in the Sierra Nevada, are in transitional pelage and consequently very difficult to determine. Some approach exceedingly close to *Tamias quadrimaculatus* in coloration. The habits of this species appeared similar to those of *T. amœnus*.

6. *Tamias minimus pictus* Allen. Desert Chipmunk.

This species was found only in the Carson Valley, Nevada. It was common in the sage brush, sometimes a long distance away

from trees, but it was particularly abundant in brush heaps, old lumber piles, and was common on fences. The two specimens taken on August 9 were caught in a cavity between a fence-board and post. They were male and female, adults, and in excellent breeding pelage.

7. *Spermophilus chrysodeirus* Merr. Gilded Chipmunk.

Animals of this species seemed abundant above 6000 feet on the west slope of the Sierra and at a lower altitude on the eastern slope. They were first seen on a rocky hillside near Cisco, a station on the Central Pacific Railroad below Summit Station. Afterwards they were found commonly at Summit Station, along the Truckee River, on Mt. Tallac, and on a spur of the Sierra, skirting the east shore of Lake Tahoe and sloping down to the Carson Valley. They prefer open hillsides thinly grown with pines and most frequently make their burrows beneath rock piles and ledges. They seem to be entirely terrestrial. I did not see one on trees and bushes. They feed on various grasses and flower-seeds and probably also on the seeds of the fir and pine.

Twenty specimens show a large amount of seasonal and individual variation. No one feature appears to be constant. The dorsal stripes vary in length, breadth, and intensity of color. In six specimens only can the white stripes be traced as far as the base of the tail; they also extend forward and blend into the golden yellow of the shoulders and post-auricular patches. In one specimen, No. 72, a female, the post-auricular patches are nearly white, and others show a complete gradation to the rich golden brown of the most highly colored specimens. The shoulders vary in color from a tawny iron-gray to the deepest orange. The color of the central area of the under side of the tail varies from pale orange to deep chestnut, and the tips of the fringing hairs from silvery gray to ochreous. A young specimen about two-thirds grown, taken August 6 on Mt. Tallac, is not so bright as the adults. In it a leaden gray suffuses the lower parts and extends well up on the sides, while the crown-patch, shoulders, and post-auricular regions are only softly tinged with ochreous.

8. *Spermophilus beldingi* Merr. Belding's Spermophile.

This short-tailed spermophile is one of the most conspicuous

mammals of the high Sierras, sharing that distinction with the marmot, *Arctomys flaviventer*, and the gilded chipmunk already mentioned. It was especially abundant in colonies of half a hundred or more in the grassy valley at Summit Station. Other colonies were seen about Mt. Tallac and Pyramid Peak, always on grassy flats and gentle hillslopes.

They are short, thick-set little rodents and have a peculiar loping gait. They have the habit of sitting up on their haunches when alarmed, shared by other members of the genus. This habit has given them the local names of "picket-pins," "prairie dogs," and "woodchucks," though the latter name is more generally applied to the marmot. They often wander some distance away from their burrows. I have seen a grassy meadow covered with them feeding on grass seeds; when alarmed the whole company would rush loping to their homes. Several shot at Summit Valley had their cheek-pouches distended with the green seeds.

A series of fifteen skins shows little color variation, and that confined to the dorsal stripe and the fulvous wash of the underparts. Some young specimens, a week or two old, taken July 21 at Summit Station have nearly the exact color pattern of the adults. Another, perhaps six weeks old, taken August 12 on Mt. Tallac, is paler in color, the crown patch and dorsal stripe are faint, and the under parts are bluish gray, the color extending up on the sides.

9. *Spermophilus grammurus beecheyi* (Rich.) California Ground Squirrel.

A single specimen was taken near Red Point. Ground squirrels are common in the Sierra Nevada up to nearly 6000 feet. Higher than that they give place to the marmot, and the smaller spermophiles, *Spermophilus beldingi*. They frequent rocky hillsides, and though common they are shy and not nearly so conspicuous as in the valleys of California.

10. *Sciurus hudsonius californicus* Allen. California Chickaree.

Only three specimens were taken, two at Red Point on July 6 and one at Summit Station July 30. Several others were seen; one along a road beside Lake Tahoe, appeared to be in the black stage. My companion remarked: "That's the first *black* squirrel

rel I've seen in California." At another time a pair came close into camp high up on Mt. Tallac and fearlessly picked up some bits of bread. This species ranges higher in the mountains than *Sciurus fessor*, appearing to inhabit the Sierra from about 2500 feet up to 9500, or as far as timber extends. It delights in heavily wooded slopes filled with dense undergrowth. Its loud chattering call notes were commonly heard about Red Point, though always in almost impenetrable places.

The three specimens present no marked variation. The black lateral stripe separating the gray of the dorsal region from the white of the under parts is conspicuous in each, and the bright orange on the upper surface of the feet is also present. They are each in transition pelage, patches of new hair lying side by side with the old.

11. *Sciuropterus volucella hudsonica* (Gmelin). Northern Flying Squirrel.

A single caged specimen was given to me at Red Point. This was the only one seen though I was told they had been very numerous there the winter previous. They frequented a feed stable and barn, and became very troublesome, gnawing into sacks and destroying the grain. Many were caught in box traps but they continued to increase until some cats were placed in the barn, which routed them. Some time after, when sweeping out the place, two dozen squirrels' tails were picked up. The winter was a severe one, and plenty of food at the barn had called them from a long distance. I was told by woodcutters that sometimes in felling a tree, especially if the top was broken and bushy, some of these little animals would soar down from the top just before it fell and alight on another tree, running up quickly to the higher branches. During forest fires, which often sweep over the mountains, the flying squirrel with other animals as rare are sometimes seen. In traveling through the mountains I have asked many people about this interesting little rodent, but only a very few had ever seen it and many had never heard of it at all. Its nocturnal habits, of course, make it seem rare, but judging from the numbers found in the barn at Red Point it surely must be much more common than it is supposed to be.

12. *Arvicola* sp.? Meadow Mouse.

Three *Arvicolas*, which I am at present unable to identify, owing to the unsettled condition of the genus, were taken in a hay field in the Carson Valley, Nevada, on August 9th. They are extremely abundant in fields in some parts of the Valley, and at times are very injurious to crops.

An *Arvicola*, probably a different species, was noticed in boggy meadows about Summit Station, on Mt. Tallac, and near Pyramid Peak. These animals had well-beaten runways and numerous holes, showing that a colony of several hundred lived together. Once in a bog at the base of Pyramid Peak one of these little animals stopped for a moment at the mouth of its burrow, thus giving me time to notice its dark coloration and small size.

13. *Sitomys americanus gambelii*? (Baird). Gambel's White-footed Mouse.

White-footed mice were observed at Red Point, Summit Station, and on Mt. Tallac. A single specimen, No. 3, a male, taken at Red Point on June 27, is darker in coloration than any of the adults from Mt. Tallac. A *Sitomys*, probably referable to this species, was captured at Summit Station, but the specimen was unfortunately lost. The series of eight specimens from Mt. Tallac show great individual variation. They range from bluish in the young to deep brown with a vinaceous tinge in the adults. One specimen, No. 47 ♀, is pale yellowish, resembling in color *Sitomys americanus sonoriensis*.

This species was noticed generally in dry pine woods and specimens were caught in traps baited with bits of bread and dried fruit; a single specimen was secured while turning over a log in search of beetles.

There is some doubt whether this species may not be the *Sitomys boylii* of Baird, which was described from a single specimen taken by Dr. C. C. Boyle in El Dorado County, on the Middle Fork of the American River in 1852. The description of *Sitomys boylii* is imperfect and the type specimen is faded and mutilated, so that it is impossible to find exactly what the characters of that species are, as noted by Dr. Allen in his recent review of some Californian *Sitomys*. My specimens, with one exception, were all taken at a high altitude. It is not known



whether the animal taken by Dr. Boyle, was high up on the mountains or down in the foothills close to the Sacramento plain; if the former, my specimens were from the neighborhood of the type locality.

The specimens here referred to were first identified by Dr. Allen as *Sitomys boylii*, but were later referred to *S. a. gambelii* and his identification is here followed.

14. *Neotoma cinerea* (Ord.) Bushy-tailed Wood Rat.

Found only at the Glen Alpine Sulphur Springs, on Mt. Tallac, where six specimens were secured. The species was said to be formerly abundant about the feed-stable and buildings of the resort, but had been nearly exterminated by cats about the place; when I arrived there appeared to be only one pair, with its young. On August 3 I trapped an adult male, and the same day one of the workmen brought me three young only a few days old. Later, August 12, I secured the female and another young one.

This species seems to have habits in common with *Neotoma fuscipes* of the interior valleys of California, especially the habit of carrying food away from cabins. An old miner told me that during the preceding winter these rats had taken possession of his cabin when he was away, and in a few nights had completely removed a sack of potatoes. Later he had found the greater part of the stolen goods in a hollow stump near his dwelling. I have also been told that these animals frequently bring back articles to replace the things stolen, and have from this habit been called "trading rats," but I have no proof of this assertion.

The six specimens vary in color. The adult male is dark gray above with faint shadings of brownish yellow along the sides, extending to the rump and for a short distance along the upper surface of the tail. The latter is dark gray for the most part, but is tipped with grayish white. The female of this species is a brownish yellow, richer along sides and on rump and shoulders. Below from nose to tip of the tail it is similar to the coloration of the male. The three young, collected August 3, are dark gray above, the color intensifying posteriorly until the lower back and rump are almost black. The brownish wash has begun to appear along the sides and about the shoulders. Below, along the median line, the pelage is pure white, but

blends into the gray of the sides. The young, collected August 12, is not so dark as the specimens taken on August 3, the gray having become clearer. There are also more pronounced traces of yellowish brown. Unfortunately I took no measurements and am unable to give comparative size.

15. *Thomomys monticola*\* Allen. Sierra Nevada Gopher.

Four specimens of this gopher, which proved to be new, were taken on Mount Tallac, at altitudes varying from 6500 feet, close to Lake Tahoe, up to 9500 feet near the summit of the mountain. The work of gophers was observed all over the high Sierras, especially in damp patches of vegetable mould about Summit Station, along the Truckee River, and on the grassy glades and slopes of Mount Tallac. On this mountain they were often noticed throwing up earth in the daytime and were especially abundant well toward the summit, often close to snow fields.

This gopher is characterized by a long and narrow skull, an exceptionally broad interparietal bone and very long and soft pelage. Above it is pale reddish brown, tinged with gray, and below, ashy white.

16. *Lagomys schisticeps* Merr. Gray-headed Pika.

Only two specimens of this curious little alpine rodent were secured; these were taken on July 28 among broken rocks on the very summit of Mt. Tallac. No more were seen in that locality, but on Pyramid Peak and on a rocky ridge near it they were abundant on August 5. It was late in the afternoon and the snow banks and tiny streams of water were freezing in shady places, but the little animals did not seem at all to mind the cold. They ran about over the rocks and snow beds and some had ventured a distance away from their homes and were feeding on a bright red alpine flower. Their sharp, squeaking cries were continually heard even after the sun had set. Several of their nests had little heaps of flower-stems and grass before the openings, and it may have been that even at this early date they were laying in their winter stores.

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\* *Descriptions of Four New Species of Thomomys, with Remarks on other Species of the Genus.* By J. A. Allen, Bull. Am. Mus. Nat. Hist., v, p.48, April 28, 1893.

The only adult specimen, No. 42 ♂, is in worn pelage. The ends of the hairs are worn off along the back, leaving it dark brown in places. The young, No. 44 ♂, has long silky pelage of a grayish tawny color with interspersed black hairs.

17. *Scapanus townsendii* (Bach). Townsend's Mole.

A single specimen was taken at Red Point in a cellar. The marks of moles were seen all over the high Sierras especially about snow fields on Mt. Tallac, but no specimens were taken.

18. *Putorius arizonensis* Mearns. Arizona Weasel (?)

A *Putorius*, provisionally referred to this species, was taken high up on Mt. Tallac July 29. It was seen in a boggy piece of meadowland searching among dwarf willows. A few days later another specimen was seen in a similar place, but it was not secured.

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The following is a list of the mammals seen or known to inhabit the Sierra Nevada, but no specimens were taken.

19. *Cariacus columbianus* (Rich.) Black-tailed Deer.

This deer is common all through the mountains, in summer, up to 9500 feet. In the fall it migrates from the higher altitudes down to about 4500 feet and lower, but usually it is not found above that altitude in winter.

20. *Antilocapra americana* Ord. Antelope.

The antelope has been seen along the eastern base of the Sierra Nevada in the Carson Valley, but its range does not reach up into the mountains.

21. *Arctomys flaviventer* Aud. and Bach. Yellow-bellied Marmot.

Marmots were first seen near the Central Pacific Railroad at about 6000 feet. They were common about Summit Station and on the mountain sides along Donner Lake, frequenting granite ledges and rock piles. But on Mt. Tallac they seemed the most abundant, frequenting the slopes of the mountain from near Lake Tahoe to the very summit. About the summer resort at the Glen Alpine Springs, near the base of the mountain, they were abundant, and when everything was quiet about the place they often approached close to the kitchen in search of bits of vegetables

and refuse. Higher up on the mountain they were exceedingly abundant. On bright days a dozen or more could often be seen at once playing about logs and rock piles. They feed largely on grass and seeds; and down to certain meadows they had well-beaten trails leading from their homes in rock-ledges. I frequently found their burrows under stumps and the roots of trees. Judging from the number of entrances and the amount of excrement, several individuals occupied each den, and from appearances the dens had been inhabited many years.

The flesh of the marmot furnishes food to a large number of Nevada Indians who come up into the mountains for the summer months. They usually hunt with shotguns loaded with heavy shot, and catch the animals away from their dens by lying quietly close to them. During August the reports of guns on the higher parts of the mountain were continually heard, and an Indian has been known to secure two dozen in the course of the day. The flesh is said to be excellent eating and forms a delicacy at some of the resorts about Lake Tahoe.

22. *Spermophilus leucurus* Merr. Antelope Squirrel.

This animal was seen only in the sandy, sage-covered plains east of the Carson Valley, Nevada.

23. *Spermophilus grammurus* Say, Ground Squirrel.

Three or four individuals supposed to be of this species were seen along the base of the mountains west of the Carson Valley. They had burrows in the rocky hillside and allowed me to approach on horseback quite close to them.

24. *Sciurus fessor* Peale. California Gray Squirrel.

This species is common in the sugar and yellow pine belt along the west slope of the Sierras. It was seen on the Forest Hill Divide from about 2500 feet up to 5500. North of the North Fork of the American River, in the neighborhood of Blue Cañon, a few were noticed, but none were above the altitude of the sugar pine belt. In the neighborhood of Red Point they were generally distributed through the timber; their barking was frequently heard. Their chief food is the seeds of the sugar pine, *Pinus Lambertiana*, the largest and most beautiful pine in the Sierra Nevada. Under almost every tree are chips

which the squirrel has gnawed from the cones. He does not wait until the cone is ripe, but often gnaws the scales from the young cone while it is yet hanging on the tree. I have sometimes seen this squirrel hanging head downwards a hundred and fifty feet from the ground feeding on a cone. The gray squirrel does not hibernate, but usually descends lower in the mountains during the heavy snows. In the winter of 1891-92 I saw them frequently in the neighborhood of Blue Cañon running about over snow four feet deep. When chased they would not take to trees at once, but continued to run over the snow until closely cornered. Dogs are often used in winter to hunt them.

25. *Aplodontia major* Merr. California Sewellel.

This striking rodent was observed in the neighborhood of Red Point, and about a grove of big trees, *Sequoia gigantea*, about twenty miles southeast of Red Point, in Southern Placer County. Near Red Point two small colonies were seen in boggy land about springs. Both places were densely overgrown with brush and weeds. No specimens were taken here, but their presence was noted by freshly gnawed stems about their burrows. At the big tree grove a much larger colony was found. Their burrows were in the bottom of a ravine among dense beds of moss, thickly shaded with tangled bushes. A delicate mountain cranberry, *Vaccinium occidentale*, grew abundantly about the place, and little heaps of the stems, some with the berries still attached, lay scattered about the entrances to the dens. Large quantities of stems of *Ceanothus* and *Rhododendron* were found gnawed into lengths of about six inches. Some were over half an inch in diameter and freshly gnawed, others seemed several years old. I heard its shrill cry several times when near this colony, but saw only one.

The name "mountain beaver," by which this animal is known to the miners, has been given to it on account of its habit of gnawing sticks like the beaver. The Indian name is "sewellel." This particular species is *A. rufus*, and is found throughout Washington and Oregon and south in Western California to Humboldt Bay. There is a specimen in the University Museum taken by Mr. Chas. Fiebig at Eureka.

26. *Fiber zibethicus* (Linne). Muskrat.

Muskrats were abundant in the sloughs and marshes in the Carson Valley, Nevada.

27. *Neotoma fuscipes* Cooper. Dusky-footed Wood-Rat.

A wood-rat supposed to be of this species comes up to at least 3000 feet on the west slope of the Sierra Nevada. Their large nests were seen in the vicinity of Forest Hill.

28. *Thomomys bottæ* Less.

A gopher is found from the Sacramento plains up to at least 4000 feet.

29. *Zapus hudsonicus* (Zimm.) Jumping Mouse.

This mouse is included in the list of mammals found in the Sierra Nevada, on the authority of a trapper, a Mr. Dent, who informed me that he had often taken it with poison placed out for foxes and wild cats.

30. *Erethizon epixanthus* Brandt. Western Porcupine.

The presence of this species was noticed in numerous places in the high Sierra. Many pine trees about Mt. Tallac and Pyramid Peak had patches of gnawed bark, and the animal's quills were frequently found. A single dead specimen was found in a meadow near Pyramid Peak on August 10.

31. *Lepus sylvaticus auduboni* (Baird.) Cottontail Rabbit.

A few specimens of this rabbit were seen on the Forest Hill Divide, at about 3000 feet. They are abundant from the Sacramento plains up to that altitude or a little less.

32. *Lepus americanus washingtoni* Baird. Western Varying Hare.

Some of this species were seen about Dutch Flat, in Placer County, in the winter of 1891-92. In the high Sierra I am told that they are nearly white in midwinter.

33. *Lepus texianus* Waterhouse. Texan Jack Rabbit.

A few specimens were seen along the base of the mountains west of the Carson Valley.

34. *Lepus californicus* Gray. California Jackass Rabbit.

This species is very abundant in the Sacramento Valley and in the mountains to at least 2500 feet. Some were seen on the lower end of the Forest Hill Divide.

35. *Sorex* sp.? Shrew.

No doubt several species of shrews inhabit the Sierra Nevada Mountains. Tracks of a large species was seen about a marshy lake on Mount Tallac on August 3.

36. *Ursus americanus* Pallas. Black Bear.

Bears are common in places in the mountains from the Sacramento plains to the timber line. About the Sequoia grove, in southern Placer County, several individuals must have had their dens, for there were numerous fresh tracks and torn bark on the tree trunks. This bear has the local names of "brown bear" and "cinnamon bear" among hunters and miners.

37. *Ursus horribilis* Ord. Grizzly Bear.

At one time this was the most conspicuous bear in the mountains, and many wild tales are told of it by the early miners. Now, however, very few remain, and these have retreated into the wildest and most inaccessible places. From the reports of trappers there is reason to believe a few still exist on the western slopes of Pyramid Peak.

38. *Procyon lotor* (Linne). Raccoon.

This animal is abundant from the Sacramento up to at least 4500 feet. Its tracks were seen about a spring near Red Point, in June.

39. *Bassariscus astuta* (Lich.) Ring-tailed Cat.

This animal is common in the mountains up to 4000 feet or higher. The miners frequently tame them for pets.

40. *Lutra canadensis* (Turton). American Otter.

A single specimen was captured by Mr. Dent during the winter of 1891-92 on the South Fork of the American River, in El Dorado County. This animal is exceedingly rare; during ten years' trapping he had seen only five specimens.

41. *Mephitis mephitis* (Shaw). Common Skunk.

Skunks are common in the lower altitudes of the Sierra Nevada Mountains.

42. *Spilogale phenax* Merr. Little Stupid Skunk.

A single specimen was killed by a rancher on the lower Forest Hill Divide.

43. *Taxidea americana* (Bod't). Badger.

Badgers are common along the eastern base of the Sierra Nevada bordering the Carson Valley, and also in the lower western slope to at least 2000 feet.

44. *Gulo luscus* (Linne). Wolverine.

Mr. Dent informed me that he was sometimes troubled in his trapping by the depredations of wolverines. They made the rounds of his traps, eating such animals as the martin and fisher. He said they were found mostly above 5000 feet in the densest fir and pine timber.

45. *Putorius vison* (Schr.) American Mink.

A single specimen was seen in a pond in the Carson Valley, Nevada. A poultry yard near by was frequently visited by these animals and the owner had succeeded in trapping several.

46. *Mustela pennanti* Erxleben. Pennant's Martin; Fisher.

One individual was seen near the resort on Mt. Tallac shortly before my arrival. Mr. Dent informed me they were the most valuable animals to trappers, and that he frequently secured several dozen during the winter. They prefer the high wooded ridges of the west slope of the Sierras above 4000 feet.

47. *Mustela americanus* (Turton). Martin.

I learned from Mr. Dent that this species is common in the higher forests and is associated with the fisher.

48. *Urocyon virginianus virginianus* (Schr.) Gray Fox.

Foxes were noticed from the Sacramento plains up to about 4000 feet, and they no doubt go much higher.

49. *Vulpes fulvus argentatus* (Shaw). Silver Fox.

This fox is found only in the higher forests. Mr. Dent has frequently trapped it, and in the black stage of the pelage is one of the most valuable fur-bearing mammals, the skins often bringing thirty-five dollars apiece.

50. *Canis lupus griseo albus* (Linne). Gray Wolf.

This species has been seen several times by Mr. Dent in the dense forests above 6000 feet.

51. *Canis latrans* Say. Coyote.

The coyote is common on both sides of the Sierra Nevada Mountains, and in summer frequently follows flocks of sheep to



the highest meadows. This animal and the "California Lion" are the sheep-herders' greatest enemies.

52. *Felis concolor* Linne. California Lion; Panther.

This beast is common in places on both sides of the mountains and extending to high altitudes. It is very destructive to sheep and colts. Some horse ranches have had to be abandoned on account of its ravages.

53. *Lynx rufus* (Güld.) Wild Cat.

Apparently this species has about the same range as the mountain lion. None were seen about Red Point, but it is said to occur in the neighborhood and is destructive to poultry yards.

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## DISTRIBUTION OF SOUTHERN CALIFORNIA TREES.

BY S. B. PARISH.

The distinguishing feature of the natural vegetation of the five southern counties of California is the prevalence of shrubs. Over probably three-fourths of the surface this was the principal growth. Scattered in open order over desert and plain and valley affording clear space or sheltered covert for a multitude of humbler plants, or massed on hillsides in close and often impenetrable chaparral, it was seldom that shrubs gave place to meadows or forests. The aridity of the climate is doubtless the cause of this peculiar condition, woody plants being better able to endure a deficiency of moisture than those of a more succulent nature, while from the same deficiency the former are unable to develop into arboreal forms. From the same cause many species are here stunted shrubs or barely arborescent, which in cooler and moister climates attain to the dimensions of considerable trees.

Hence, too, at lower altitudes the arboreal vegetation is mostly riparian. The streams are scantily fringed with cottonwood, sycamore, alder, and a few species of willow, which do not extend beyond the irrigating influence of the water. In other cases the close proximity of a moist subsoil enables a grove of trees to be sustained, of which the cottonwood groves which formerly existed in the San Bernardino and the San Jacinto

February 6, 1894.

Valleys, and the palm and mesquite groves of the deserts are examples. The belt of Blue Oak (*Quercus Engelmanni*) which stretches across the hill country of San Diego County, and the park like growth of *Quercus agrifolia* which covers the slopes in the neighborhood of Pasadena, are perhaps to be attributed to the moisture supplied by the ocean fogs which roll in and condense upon the seaward exposures which they occupy. The exception to the rule is found in that peculiar forest of yucca and juniper which fringes the northern base of the San Bernardino Range from its eastern extremity to the upper end of Antelope Valley, and whose existence or limitation seems to have no perceptible connection with hydrographic conditions. Its constituent trees are the only ones that have solved the problem of arboreal growth without a continuous supply of moisture.

At higher altitudes the cooler air and greater humidity afford more favorable conditions for tree growth; the chaparral itself becomes denser and larger, and at an altitude of between 4000 and 5000 feet a coniferous forest begins which reaches nearly to the summit of the highest mountains.\* This belt, which occupies the higher parts of the San Bernardino Range and its continuation, the San Jacinto and Cuyamaca Mountains, is by no means a continuous one. It rather consists of a series of forested tracts limited in area in accordance with their altitude and slope-exposure; some mere patches measured by acres, while the largest extends from near the Cajon Pass to Grayback Mountain. West of this main forest there are small bodies of coniferous trees in the Cucomonga and San Antonio Mountains, in the so-called Sierra Madre, and in the Liebre Mountains, and to the south larger and more valuable forests occupy the San Jacinto and Cuyamaca Mountains. No accurate measurements of these forest areas have ever been made, and, indeed, could not be made without great expense and difficulty, so rugged and

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\* There are but two bald-topped mountains in the whole region; San Antonio, 9630 feet high, and Grayback, 11,725 feet high. The latter is pine-clad to within 200 feet of the summit, and covered with the standing trunks of dead pines to the very top, so that there cannot be said to be any point above tree line.

broken are the mountains in many parts, and so invaded and intersected are the wooded tracts by chaparral. Compared with the great forests at the north these are not only insignificant in extent, but are equally unable to sustain the comparison in the size of the trees, or the density of their growth. Scattered in loose array over the hillsides, it is only on the moister soil of the flats, or in the shelter of cañons that the trees cast a dense shade, or attain to lofty proportions; yet they do not lack the extent and magnitude to excite those feelings of admiration and exaltation which forests ever raise in the mind, while their park-like disposition and the variety of species free them from gloom and monotony.

#### THE SAN BERNARDINO FOREST.

The outline of the area occupied by the largest, or the San Bernardino forest is that of a wedge, the point near the Cajon Pass, broadening eastward to Grayback Mountain; the length being about forty miles, and the greatest breadth twenty miles, the district included being in part forest, and in part chaparral or barren rock. On the south from a valley base of about 1200 feet above sea level the mountains rise with great abruptness to a crest of from 4000 to 8000 feet altitude, which runs in a generally east and west direction. The northern slope of this ridge, less abrupt than the southern, constitutes the water shed of the Mojave River, and on it is located the largest and best, as well as the most accessible body of timber. This is nearly twenty miles in length, and from one to three miles in breadth. South and east of this axis, and separated from it by the gorge of the Santa Ana River, which receives their drainage, rise the twin peaks of San Bernardino and Grayback. This region is of an exceedingly rugged character, and the forests which it nourishes are broken and difficult of access.

Commencing now at the southern foot of the range, a few small spruce (*Pseudotsuga macrocarpa*) are found on sheltered western or northern exposures, along the cañons, at about 2500 feet altitude;\* these increase in size and in abundance until at between 3000 and 4000 feet altitude both sides of the

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\* On East Twin Creek, below the Arrowhead Hot Springs, a few grow as low as 1700 feet altitude.

cañons are usually clothed with them. At about 3000 feet a thin strip of dwarf pine (*Pinus tuberculata*) stretches for some miles along the face of the range, bounded above and below by the dense chaparral of *Ceanothus* and manzanita, which at this altitude has replaced the *Adenostoma* of the lower slopes, and is otherwise unbroken for another thousand feet. At 4000 feet the spruce is displaced by the other coniferous trees which constitute the main forest. Below 5000 feet this is mostly confined to the northern slope of the range, but above that overflows to the southern side, and, indeed, below it on sheltered slope-exposures. It is essentially a yellow pine (*P. ponderosa*) belt, that being the prevailing species nearly to the tree limit; with it are commingled, without any apparent vertical disposition, many firs (*Abies concolor*) and Post Cedars, smaller numbers of Black and Big-cone Pines (*P. Jeffreyi* and *P. Coulteri*), and still fewer Sugar Pines, together with an abundance of Kellogg's Oak, especially at the lower levels. This forest continues without appreciable difference to about 11,000 feet on the sides of Grayback Mountain, where it begins to be intermixed with *Pinus contorta*, which in small isolated groups occurs in Bear Valley, as low as 6000 feet. This in turn gives way at about 11,500 feet to *Pinus albicaulis*, which alone, forming the topmost belt, reaches nearly to the summit, 11,725 feet above sea level.\* On the northern side of the range, which, it must be remembered, is the one facing the desert and affected by its aridity, the spruce re-appears at about 7000 feet altitude, but very sparingly, and in small groups in sheltered and moist situations. At 6000 feet *Juniperus occidentalis* is mingled with the pines, and in one place, mixed with *Cercocarpus ledifolius*, forms a belt between 6000 and 7000 feet altitude. Beneath this, and separated from it by an interval of chaparral, is a similar belt of Piñon Pines (*P. monophylla*) between 4000 and 5000 feet, and connecting in places with the upper edge of the Yucca belt. The Juniper and the Piñon belts are about twelve miles long, their failure to extend the whole length of the range being due to other causes than elevation.

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\* For most of my information concerning the Grayback forest I am indebted to Mr. W. G. Wright, who has repeatedly explored that mountain.

We have then in these mountains a great Yellow Pine belt of mixed coniferous trees;\* at its upper edge a belt of *Pinus contorta* is indicated, capped by a well-defined belt of *Pinus albicaulis*; on the seaward side it is based on a zone of *Pseudotsuga*, and on the desert side by a belt of Juniper superimposed on one of Piñon. The smaller forests to the west and south, so far as known, include only the spruce and yellow pine belts.

#### ECONOMIC ASPECTS.

In the San Jacinto cottonwoods a small mill was for a time employed in turning out material for orange boxes, but with this exception the trees of the lower altitudes have been utilized only as a source of fuel supply, and a most important one for a region so distant from good coal measures.

The San Bernardino forest was at once drawn upon for lumber by the first American settlers in the subjacent valleys, and has been continuously worked up to the present day. Operations have been confined to the watershed of the Mojave, the only part of the forest sufficiently accessible to be worked with profit under present market conditions. Of the original forest of this watershed less than one-third now remains. In it are now located eight steam saw mills, capable of a total output of ten million feet B. M. in a summer run of six months. From various causes, dullness of business, exhaustion of the timber supply, and the competition of northern lumber, only two or three of these mills have been operated during the last two years, and all but three of them would entirely use up their accessible timber in one or two seasons' run. The product is drawn by horse teams to San Bernardino, where it has sold within late years at from twenty to sixteen dollars per thousand B. M., nine to seven dollars of the price being chargeable to freight. Most of the lumber is, of course, yellow pine. Mill men claim that of this there are two kinds; one, recognized by the broad plates of the bark, has a thin sap-wood, and the wood is soft, straight-grained and durable, and yields a good

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\* As already stated, the different species composing this belt are not segregated in separate zones, but closer observation will probably show that *Pinus jeffreyi* and *Libocedrus decurrens* have an upper limit somewhere between 7000 and 8000 feet.

percentage of clear lumber; the other, marked by a closer-checked bark, has more sap-wood, is cross-grained, readily decays, and is fit only for rough lumber. The difference of quality is said to be one of variety in the trees, and not to be due to age or place of growth. I have not been able to detect any botanical differences, except in the character of the bark, as above indicated. Black and Big-cone Pine, when sawn, is put in with the lower grade of yellow pine. The lumber from the sugar pine is most esteemed of all, most of it being clear. Post Cedar is sawn into dimension stuff, and is highly valued for its durability. It is rendered unfit for finer uses by the ravages of a dry-rot (*Dædalia vorax* Harkness) by which it is infested. The fir furnishes a light and strong lumber, but one difficult to season without warping; it is used to a small extent for scantling and bridge-flooring. None of the other trees are sawn. A few posts are made, but the destructive industry of the shingle and shake maker is a thing of the past, the market being supplied with redwood. In the San Jacinto forest there are two saw mills, their product, the amount of which I am not able to state, finding a market in the San Jacinto Valley.

The real economic value of these forests is as conservators and regulators of the water supply, a matter of most vital importance in a region dependent upon irrigation for its fertility. Fuel and lumber may be brought from afar, but water must be obtained near at hand. Fortunately public attention has been awakened to the importance of forests from this point of view, and in pursuance of the wise forestry policy of the Harrison administration, three forest reserves were set apart in Southern California, the San Bernardino Reserve of 737,280 acres, the San Gabriel Reserve, 555,520 acres, and the Trabuco Cañon Reserve, in Orange County, containing 49,920 acres. A proper supervision of these reservations will not only preserve them, but will also greatly restrict the destruction by fire and by the ravages of sheep in those portions of the forest that have passed into private ownership. Where the original forest has been removed an abundant growth of seedlings springs up, including all the species of the former growth in about their original proportions; so that if the destruction of them is prevented nature herself will in time reforest the denuded mountains.

## PHYTOGRAPHIC RELATIONS.

The region here under consideration presents three distinct floras; that of the mountains, that of the desert, and that of the district between the main range and the sea coast, which may be called the intramontane. Adopting Dr. Merriam's phytographic areas, the mountain flora belongs to the Nevadan subzone, the desert to the Sonoran proper, and the intramontane to the Californian, or in a more general view the whole territory may be regarded as a part of the great Sonoran life area, into which projects, along the axis of mountains, a narrow arm of the Boreal. These relations become evident from a tabulation of the trees, and would be further enforced by an examination of the distribution of the shrubs and herbs.

## MOUNTAIN AREA.

<i>Acer glabrum</i>	<i>Pinus albicaulis</i>
<i>Prunus emarginata mollis</i>	<i>Pinus ponderosa</i>
<i>Cornus Nuttallii</i>	<i>Pinus Jeffreyi</i>
<i>Salix flavescens</i>	<i>Pinus Coulteri</i>
<i>Quercus Kelloggii</i>	<i>Pinus Murrayana</i>
<i>Castanopsis chrysophylla</i>	<i>Abies concolor</i>
<i>Pinus Lambertiana</i>	<i>Libocedrus decurrens</i>

This zone is connected with the intramontane flora by a belt of *Pseudotsuga macrocarpa*, and with the desert flora by a belt of *Cercocarpus ledifolius* and *Juniperus occidentalis*. *Negundo Californica* and *Pinus tuberculata* also occur on the edge of this zone.

## INTRAMONTANE AREA.

<i>Rhamnus Californica</i>	<i>Juglans rupestris</i>
<i>R. Californica tomentella</i>	<i>Quercus chrysolepis</i>
<i>Acer macrophyllum</i>	<i>Quercus agrifolia</i>
<i>Negundo Californicum</i>	<i>Quercus lobata</i>
<i>Prunus ilicifolia</i>	<i>Alnus rhombifolia</i>
<i>Prunus demissa</i>	<i>Populus Fremonti Wislizeni</i>
<i>Cercocarpus parvifolius</i>	<i>Salix laevigata</i>
<i>Heteromeles arbutifolia</i>	<i>Salix lasiolepis</i>
<i>Sambucus glauca</i>	<i>Salix lasiandra lancifolia</i>
<i>Umbellularia Californica</i>	<i>Platanus racemosa</i>

*Lyonothamnus floribundus*, *Quercus Engelmanni*, and *Pinus Torreyana* may be regarded as endemic. The bare projection into this area of the Coast flora is indicated by isolated groups of *Myrica Californica* and *Arbutus Menziesii*. *Æsculus Californica*, *Quercus Douglasii*, *Q. Wislizeni frutescens*, and *Pinus Sabiniana*, belonging to this flora barely enter our territory from the San Joaquin region, and hence are forced into a narrow belt between the desert and the mountains, over which they have been unable to pass into a region better suited to them.

## DESERT AREA.

<i>Fremontia Californica</i> *	<i>Chilopsis saligna</i> *
<i>Dalea spinosa</i>	<i>Yucca baccata</i> *
<i>Olnya Tesota</i>	<i>Yucca brevifolia</i>
<i>Prosopis juliflora</i> *	<i>Pinus monophylla</i>
<i>Prosopis pubescens</i>	<i>Juniperus Californica</i> *
<i>Acacia Greggii</i> *	

The close connection between this and the intramontane flora is shown by the fact that six of the above eleven species, designated by an \*, pass to a greater or less extent into the intramontane district, while *Populus Fremonti Wislizeni*, of the former, passes into this desert. *Pinus Parryana*, which barely enters this area, and perhaps *Washingtonia filifera*, are prolongations of the Lower Californian subarea.

In the following table is shown the distribution in the different areas of the trees, separated according to their sizes: shrubs, and trees that barely enter the district being omitted. It will be seen that development is in accordance with the relative moisture of the different areas. The paucity of arboreal growth in the desert region is especially remarkable, when it is remembered that it is geographically the most extensive of the three.

	Mountain.	Intramontane.	Desert.	Total
Arborescent; up to 20 feet. ....	4	5	3	12
Small trees; up to 50 feet. ....	3	9	4	16
Medium trees; under 100 feet. ....	4	6	1	11
Large trees; over 100 feet. ....	6	0	0	6
Total. ....	17	20	8	45



The following list includes all species which have been reported as trees, or which are so elsewhere, although here reduced to shrubs. The dimensions given are those of full-grown, but not exceptionally large specimens. The dimensions as well as the altitudes are estimated; it is regretted that actual measurements cannot be given. The ranges are assigned from personal observation and reliable information; further knowledge is more likely to extend than to restrict them.

## LIST OF TREES.

*Fremontia Californica* Torr. *Fremontodendron Californicum* Coville Death Val. Rep. 74. Arborescent shrub, 12 feet high, the stems 4 inches in diameter. On dry hillsides often forming extensive thickets which are conspicuous from a long distance when in bloom, from the abundance of the showy yellow flowers. The dense hairs which clothe the capsules are stinging to the flesh. Fls. May; Fr. August. Abundant along the northern, or desert, base of the San Bernardino Range from Cushenberry Cañon to Antelope Valley. Rare on the southern side of the Range; Lytle Creek. Also near San Diego, *Ganong*.

*Rhamnus Californica* Esch. Shrub, 12 feet high, with slender stems. Fls. April-June; Fr. Sept. Throughout the mountain region at from 2500 to 5000 feet altitude on the southern slope of the San Bernardino Range to the Coast.

*Rhamnus Californica* var. *tomentella* Brew. & Wats. *R. tomentella* Benth. Greene Fl. Fr. 80. Coville, l. c. 78. Like the species in habit and size, and of the same range, but less abundant.

*Æsculus Californica* Nutt. Small tree, or arborescent shrub, 15 feet high, trunk 6 inches in diameter, usually forming groves on hillsides; when solitary with rounded compact head. Fls. June. A single tree, edge of Antelope Valley, but abundant in the Cañada de las Uvas, at Ft. Tejon, a few miles over the Los Angeles County line. The reference to its occurrence in the San Bernardino Mountains, in the Forestry Report of the 10th U. S. Census (ix. 44) is unsupported by any data.

*Acer glabrum* Torr. Shrub, 5 feet high. Rare. Head-

waters of Mill Creek, San Bernardino Mountains, at 6000 feet altitude.

*Acer macrophyllum* Pursh. Small tree, 20 feet high, with slender trunk; often in small clumps from a common root. Fls. March; Fr. May. Common but not abundant in cañons on the southern slope of the San Bernardino Range, from San Gorgonio Pass to Los Angeles, at about 2500 feet altitude.

*Negundo Californicum* T & G., Fl. i, 250. *N. aceroides* Moench., var. *Californicum* Sargent, Gard. & For. ii, 364. *Acer Californicum* Greene Fl. Fr. 76. *A. Negundo*, L., Coville, l. c. 81. Tree 30 feet high, the trunk a foot in diameter. Leaves pinnately 3-5 foliate. Fls. March. Rare. San Bernardino Mountain, on a wet, rocky flat in a cañon above Yucaipe, at 3500 feet altitude.

*Dalea arborescens* Torr. The type is a fragment in the Torrey Herbarium at Columbia College, ticketed, "Fremont's 2d Exped., April 15, 1844. Mountains of San Fernando, a Southern continuation of the Sierra Nevada. A small tree." According to Fremont's Journal he was at that date in or near what is now known as Antelope Valley. It has not been met with since, although the region passed over by Fremont has been carefully examined with a view to its rediscovery by Mr. Pringle and by the writer. A low shrub, 3-4 feet high (645 *Parish*, May, 1882, distributed as *D. Californica*,) growing in ravines of the Mojave Desert at Fishponds, about 80 miles further east, agrees with the description of the species except as to size and the numerous deciduous yellow glands of the young shoots. The original character given is "*fere glandulosa*," but the deciduous glands might easily have been absent in the insufficient type specimen. Prof. Sargent indicates in the *Sylva* that this is probably identical with the Fremontian plant.

*Dalea spinosa* Gray. Small tree 25 feet high, with intricate, bushy top; nearly leafless; the trunk, 10 inches in diameter, of an ash-gray color, as are the branches and slender twigs. Fls. June. Common in the dry washes of the Colorado Desert. Agua Caliente, (Palm Springs;) Indio; Vallecito; Carriso; etc.

*Olneya Tesota* Gray. Rough, spreading tree, 20 feet high, the

trunk hardly a foot in diameter. Flowers often 8-10; pod viscid, rough hirsute, and with some tack-shaped glands. Dry washes of the Colorado Desert from Indio to the Colorado River. Mesquite Cañon, etc. Larger and more abundant in Arizona.

*Parkinsonia aculeata* L. "Hills of the Colorado, near Ft. Yuma, Schott." Torrey, Mex. Bound. 59.

*Parkinsonia microphylla* Torr. "Colorado River, near Ft. Yuma," Torrey, l. c. These two species of Southern Arizona have not been observed by recent collectors at the above station.

*Parkinsonia Torreyana* Wats. Straggling tree, 15 feet high, trunk 10 inches in diameter. Fls. April. Frequent in dry washes of the Colorado Desert from Toros to the Colorado River; Indian Wells, etc.

*Prosopis juliflora* DC. Straggling tree 20 feet high, usually several stemmed from the base, or arborescent. In various kinds of soil, but indicating a damp subsoil, and attaining its greatest development in the desert. Fls. (at San Bernardino) May; Fr. September. Throughout the entire desert region, scattered, or rarely, as at Indio, forming groves. As a shrub extending as far west as San Bernardino, Temecula, and San Diego.

*Prosopis pubescens* Benth. Arborescent shrub, 15 feet high, with slender stem. Common, but less abundant than the last, through the desert region, usually growing in ravines or the borders of dry washes. Whitewater; Warm Springs, etc.

*Acacia Greggii* Gray. Armed shrub 2-10 feet high, forming dense thickets of small extent, usually on dry hillsides. Western border of the Colorado desert at 2000-3000 feet altitude; San Gorgonio Pass; San Felipe. Also at Warner's Hot Springs, within the intramontane district.

*Prunus emarginata* Walp., var. *mollis* Brewer. Arborescent, the slender stems 10-15 feet high, usually several clustered. Leaves and stipules glandular toothed, lower surface of leaves sparsely hirsute, peduncles and petioles tomentose with long, soft hairs. Fls. June. Rare. Border of streams in ravines, Bear Valley, 6000 feet altitude, San Bernardino Mountains.

*Prunus demissa* Walp. *Cerasus demissa* Greene, Fl. Fr. shrub 2-6 ft. high, on hillsides, often in open patches.

Fls. May-June; Fr. August. Not uncommon in the Cuyamaca and San Bernardino Mountains at about 4000 feet altitude. Waterman Cañon; Mill Creek; etc.

*Prunus ilicifolia* Walp. *Cerasus ilicifolia* Nutt. Greene, l. c. 50. Shrubby, or arborescent and 15 feet high, with trunk 6 inches in diameter. Fls. April to June, according to altitude. Fr. red, pulpless, and astringent, October. Common on gravelly benches and hills from 4000 feet altitude on the southern slope of the San Bernardino range to the Coast. A more tree-like form of Santa Catalina Island, first collected by *Lyon*, is *P. occidentalis*, *Lyon*, Bot., Gaz. xi, 202, 333; Greene Bull. Calif. Acad. ii, 395. *P. ilicifolia*, var. *occidentalis* Brandegee, Proc. Calif. Acad. 2d. Ser. i, 209; Zoe, i, iii. *P. ilicifolia* var. *integrifolia* Sudworth, Gard & For. iv, 51.

*Cercocarpus parvifolius* Nutt. Arborescent, 12 feet high, the slender stems 4 inches in diameter. Fls. March; Fr. August. Southern slope of the San Bernardino range as high as 3000 feet altitude, passing along washes far out into the plains; thence throughout the Coast mountains.

*Cercocarpus ledifolius* Nutt. Small tree, 20 feet high, trunk 10 inches in diameter. Abundant on dry ridges on the northern side of the San Bernardino Mountains, at 6000 to 8000 feet altitude. Bear Valley; Holcomb Valley.

*Heteromeles arbutifolia* Nutt. Compact shrub, 12 feet high. Fls. June; Fr. December. Common on hillsides from 2500 feet altitude on the southern slope of the San Bernardino Range to the Coast, and on the adjacent islands.

*Lyonothamnus floribundus* Gray, Proc. Am. Acad. xx, 291, *Lyon*, Bot. Gaz. xi, 333. Brandegee, Zoe i, iii, t. 5. Small tree, growing in groves on the sides of cañons on Santa Catalina Island; endemic, and first collected by *Lyon* in July, 1884, in flower.

*Cereus giganteus* Engelm. Said to occur along the Colorado River, (*Engelmann*, Bot. Calif. ii, 450), but there seems to be no evidence of its presence in the State.

*Cornus Nuttallii* Audubon. Slender tree, 25 feet high, the trunk 10 inches in diameter, or often arborescent. Banks of

streams in the San Bernardino Mountains, at from 4000 to 5000 feet altitude.

*Sambucus glauca* Nutt. Small tree, 15 feet high, trunk a foot in diameter, and hollow, or reduced to a shrub. At lower altitudes the leaves are mostly deciduous in summer, starting again with early rains in December or January. Fls. April, May. Fruit blue or white, and with a white bloom, agreeable, July, August. Common on dry soil from about 4000 feet altitude on the southern slope of the San Bernardino range to the Coast, and on the island of Santa Catalina.

*Sambucus Mexicana* Presl. Accredited to Southern California in the Synoptical Flora, but I have been unable to verify its occurrence within the limits of the five southern counties.

*Arbutus Menziesii* Pursh. Small tree 15-25 feet high, the trunk 4-8 inches in diameter. A single small group among oaks, on the Mount Wilson trail, south side of the San Bernardino range, at 2300 feet altitude. *Davidson, McClatchie.*

*Fraxinus Oregana* Nutt. Small tree 25 feet high, trunk a foot in diameter, or more frequently arborescent, 8-15 feet high, and growing in thickets. Fl. April; Fr. September. Dry slopes, northern base of the San Bernardino Mountains, at 4000 feet altitude, Burcham's Ranch. On the southern slope from 3000 feet altitude (Lytle Creek; City Creek;) to the San Bernardino Valley, 900 feet altitude. Also in the San Jacinto Mountains, and at Warner's Hot Springs.

*Chilopsis saligna* Don. *C. linearis* DC., Coville, Death Valley Rep. 174. Small tree, 20 feet high; trunk 8 inches in diameter, or arborescent. Fls. June. Dry washes of the Colorado and Mojave Deserts, common; also as a shrub at Brookside, near Redlands, and in the San Jacinto Valley.

*Umbellularia Californica* Nutt. Arborescent, 20 feet high, growing in groups, seldom, if ever, a tree. Fls. March. Common along the bottoms of cañons, southern slope of the San Bernardino Range at 2000 to 2500 feet altitude.

*Platanus racemosa* Nutt. Spreading tree 75 feet high, the trunk 4 feet in diameter; in the mountains sometimes arborescent, Fls. April; Fr. September. Common near watercourses, from

3000 feet altitude, on the southern slope of the San Bernardino Range to the Coast. A tree growing in sandy loam at San Bernardino measures  $9\frac{1}{2}$  feet in circumference at  $3\frac{1}{2}$  feet from the ground; height about 60 feet. Another similarly situated is 13 feet 3 inches in circumference; broken off about 25 feet from the ground.

*Juglans rupestris* Engelm. in Torr., Sitgs. Rep. 171 t. 15; Sargent, 10th Census ix, 131. *J. Californica* Wats., Bot. Calif. ii, 93; Greene, Fl. Fr. 74. Arborescent shrub 15 feet high, growing in clumps, or rarely a tree 30 feet high, the trunk a foot in diameter. In cañons on the southern slope of the San Bernardino Range up to 3000 feet altitude, and occasionally along washes at some distance from the foot of the mountains.

*Myrica Californica*, Cham. Arborescent, in clumps, 12 feet high. Collected only in Rustic Cañon near Santa Monica, where, according to Dr. Hasse, it is scarce, and grows in shady, springy places.

*Quercus lobata* Née. Fort Tejon, a few miles over the Los Angeles boundary, in Kern County, is situated in a grove of magnificent oaks of this species, some of them 7 and 8 feet in diameter. Within our limits it has been reported from La Liebre Rancho in Antelope Valley.\* A single tree has been observed by Dr. Hasse at Santa Monica. It may be expected in the intervening mountains.

*Quercus Douglasii* H & A. This species barely reaches Los Angeles County on the desert side of the Liebre Mountains (Coville).

*Quercus Engelmanni* Greene, W. Am. Oak. 33, t. 17. *Q. oblongifolia* Engelm., Bot. Calif. ii. 96. Rather spreading tree, 40 feet high, the trunk 3 feet in diameter. Coast mountains of San Diego County, 15-20 miles from the sea, where it covers the hills in open groves; Pala; Fallbrook; etc. Rare on the interior slope of the same mountains; Marietta. Reported in the Bot-

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\*Merriam, N. A. Fauna vii, 333. Sargent's reference to the "San Bernardino Mountains" (10th Census ix, 138), probably applies to the same region, as no other station is known.

any of California at San Gabriel, but not met with there by recent collectors.

*Quercus Macdonaldi*, var. *elegantula* Greene, l. c. 26, 86, t. 29. The type of this oak was a tree 20 feet high, with a trunk a foot in diameter, discovered by Prof. Greene in 1885, in Temecula Cañon near Fallbrook. As a shrub from 4 to 12 feet high, and exhibiting great variation in shape and size of leaf and fruit, it is not uncommon from Fallbrook to McGee's store, near Temecula. Apparently it is confined to the region jointly occupied by *Q. Engelmanni* and *Q. dumosa*, between which species it is probably a cross, as was suggested by its proposer.

*Quercus chrysolepis* Liebm. Spreading but compact tree 40 feet high, the trunk 2 feet in diameter, or sometimes reduced to a shrub. Wood hard and brittle. Cañons of the San Bernardino Range, from 1000-5000 feet altitude on the southern slope, and from 5000-6000 feet on the northern.

*Quercus Wislizeni* A.DC., var. *frutescens* Engelm. Small tree, 20 feet high. Dry hills on the desert slope of the Sierra Liebre Mountains, between Elizabeth Lake and Tejon Pass.

*Quercus agrifolia* Née. Occasionally a large, spreading tree, 70 feet high, the trunk 4 feet in diameter, (Edgar Cañon, San Geronio Pass, altitude 2800 feet;) oftener of smaller size, 30 feet high and the trunk 18 inches in diameter. Widely distributed, but usually not very abundant, especially throughout the coast mountains, Fallbrook; Temecula; Marietta. Santa Monica Range, *Hasse*. Also about Pasadena, where it covers the hills with open groves.

*Quercus Kelloggii* Newberry. *Q. Californica* Cooper, Smith. Rep. 1858, 261; Sudworth, Gard. & For. v, 98; Coville, l. c. 196. Tree of spreading, open habit, 70 feet high, the trunk 4 feet in diameter, or at high altitudes reduced to a shrub. Fls. May-June. Common throughout the coniferous belt of the San Bernardino Range and the San Jacinto Mountains, at from 4000 to 8000 feet altitude.

*Castanopsis chrysophylla*, A. DC. Low shrub, 1 to 4 feet high, covering the slopes of the higher mountains, at from 7000 to 9000 feet altitude, with a dense and impenetrable chaparral.

Fls. June. Bear Valley; San Jacinto Mountains; San Antonio Mountain.

*Alnus rhombifolia* Nutt. Parry, Bull. Cal. Acad. ii, 351.  
*A. oblongifolia* Torr. Slender tree, 50 feet high, the trunk 2 feet in diameter. Fls. January. Abundant along streams from 3000 feet altitude on the southern slope of the San Bernardino Range to the Coast. San Jacinto Mountains; Cuyamaca Mountains. Santa Monica, Hasse.

*Salix nigra* L. Fort Mojave, the station noted for this willow in the Botany of California, is in Arizona, but it may be expected on the Californian side of the Colorado. Mr. Bebb informs me that there is in his herbarium a specimen of the subvar. *venulosa* Anders., a pubescent form of the var. *longipes*, Anders., collected by Dr. J. T. Rothrock at Elizabeth Lake, No. 187, Survey of the 100th Meridian. I have been able to find no other evidence of the existence of this tree within our limits.

*Salix levigata* Bebb. "Black Willow." The largest of the Southern California willows, 25 feet high, the trunk 18 inches in diameter, or infrequently shrubby. Fls. April. By streams or in meadows; common from 2000 feet altitude on the southern slope of the San Bernardino Range to the Coast, and on Santa Catalina Island.

*Salix lasiandra* Benth., var. *lanceifolia* Bebb. Rarely a small tree, 20 feet high, the trunk 10 inches in diameter; usually reduced to a shrub. Fls. May. Situation and continental range of the last species.

*Salix longifolia* Muhl. Reduced to a shrub. Sandy banks of streams, away from the water. Borders of the Colorado Desert, at Agua Caliente (Palm Springs), also at Lytle Creek near San Bernardino. This wide-spread species probably has a more extended range in this region than here indicated, but material and records are wanting for its definition. It is with difficulty distinguished from some forms of *S. sessilifolia* Nutt., a very common and very variable willow of the region.

*Salix flavescens* Nutt. Reduced to an arborescent shrub, 12 feet high. Fls. June. Stream banks in the San Bernardino Mountains at from 7000 to 8000 feet altitude.



*Salix lasiolepis* Benth. "White Willow." Arborescent, or sometimes a small tree, 20 feet high, the trunk 10 inches in diameter. Fls. December and January, many of the leaves persisting later. Common by streams and in meadows, from 3000 feet altitude on the southern slope of the San Bernardino Mountains to the Coast.

*Populus trichocarpa* T. & G. "Black Cottonwood." Small tree, 40 feet high, the trunk 18 inches in diameter. Fls. March. Along mountain streams from 3000 feet altitude on the southern slope of the San Bernardino Range to the Coast; also on Santa Catalina Island.

*Populus Fremonti* var. *Wislizeni* Wats. Spreading tree 80 feet high, the trunk 4 feet in diameter; or in the desert region often reduced to a straggling, misshapen tree 25 feet high, with trunk not exceeding 18 inches in diameter. Fls. February, March. Three trees on sandy loam at San Bernardino measure respectively 12 feet 4 inches, 11 feet 10 inches, and 8 feet 5 inches in circumference, each being about 70 feet in height. Prevalent throughout the entire region, mostly in the neighborhood of water. It ascends the southern slope of the San Bernardino Range to 2000 feet altitude, and the northern slope to 3500 feet. In the San Bernardino and San Jacinto Valleys there were formerly extensive groves of large trees now nearly destroyed. There is also a narrow fringe of large trees along the Mojave River from opposite Hesperia to Camp Cady. Elsewhere in the desert region the tree is sparsely present along water courses in the cañons, or, where the water is permanent, fringing its borders, as at Morongo Creek.

The species is reported in the 10th Census Report (ix, 175) as collected at "Colton, Parry," but I have been unable to detect it, and the late Dr. Parry was not aware of its existence at that station.\*

*Yucca baccata* Torr. Occasionally 15 feet high, with trunk less than a foot in diameter, or acaulescent, branches short, stiff

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\* *Populus monilifera* Ait. Trees referred to this species by Prof. Sargent, are in cultivation at Colton as street shade trees. Their origin is uncertain, and the species has never been found in a wild state in this region.

and irregular. Fls. March. Attaining its greatest development in the desert region, throughout which it is scattered, either solitary, or rarely in small groups, on dry hillsides or in washes, up to 4000 feet altitude. In similar places, but less frequent and smaller, from 1500 feet altitude along the southern base of the San Bernardino Range to the coast. In the Death Valley Report, page 202, Mr. Coville restricts the name *Y. baccata* to the acaulescent forms, separating those with trunks as *Y. macrocarpa* Coville, *non* Engelm. on the ground of their arborescence, smaller flowers and yellowish-green leaves.

*Yucca brevifolia* Engelm., Bot. King Exp. 496; Trelease, 4th Rep. Mo. Bot. Gard. 193. *Y. arborescens* Trelease 3d Rep. 163; Merriam, N. A. Fauna vii, 353; Coville, Death Vall. Rep. 201. Uncouth tree, angularly branched, 30 feet high, trunk 18 inches in diameter. Fls. April; Fr. August. On dry benches and hills along the northern base of the San Bernardino Range, from Cushenberry Springs to Gorman's Ranch, at the upper end of Antelope Valley, occupying a belt between 2500 and 4000 feet altitude and forming an open forest, interrupted in places, and varying in width, the greatest said to be opposite the Cajon Pass, 12 miles (Merriam), where a few trees are also found a short distance south of the summit. At Cactus Station, at the head of Cushenberry Cañon, there is a considerable grove at 5000 feet altitude at the Upper edge of the piñon belt. An interrupted belt is also found between Daggett and Pilot Knob (Merriam).

*Washingtonia filifera* Wendl. *W. robusta* Wendl. Handsome tree 60 feet high, the trunk 3 feet in diameter. A cultivated tree at Los Angeles, 42 years old, measures 60 feet in height and 10 feet 7 inches in circumference. One at San Bernardino in adobe soil, 22 years old, is 32 feet high and 9 feet 2 inches in circumference. Flowers on the desert in June, and fruit ripens in September; cultivated trees at San Bernardino flower in August, fruit ripening in February. This palm grows, often in extensive groves, in wet and usually alkaline soil at the bases of the mountains along the eastern borders of the depression in the Colorado desert once occupied by an inland sea; a few scattered trees mark the channel by which it was connected with the Gulf of California (Orcutt.) The groves extend for several miles up

some of the cañons of these mountains; smaller groves are found in the cañons of the San Jacinto Mountain, near Agua Caliente (Palm Springs), and a few trees in the Whitewater Cañon on the eastern side of the San Bernardino Mountain mark the western limit of the species.

*Washingtonia robusta* is an obscure species, described from young cultivated plants, and has never been identified with any uncultivated trees. Its identity with *W. filifera* can hardly be doubted. See Watson, Proc. Am. Acad. xxv, 136; Parish, Gard. & For. iil, 51, 542; Orcutt, W. Am. Sci. i, 63, 76.

*Pinus Lambertiana* Dougl. Tree of large size, 200 feet high, trunk 8 feet in diameter. Scattered throughout the higher mountains at from 5000 to 7000 feet altitude, usually in the richer and moister sort of flats and cañons. San Bernardino and San Jacinto Mountains.

*Pinus albicaulis* Engelm., Trans. St. Louis Acad. ii, 209; Bot. Gaz. vii, 4; Coll. Wks. 329, 383. *P. flexilis* James var. *albicaulis* Engelm., Bot. Calif. ii, 124. Tree 40 feet high, the trunk 2 feet in diameter, or at its upper limit gnarled and prostrate and but a few feet in height. On Grayback Mountain, constituting the upper edge of the timber belt, and extending from 1000 feet below the summit (11,725 ft.) to within 100 feet of it. Dead trees, probably of this species, are scattered up to the summit. (*W. G. Wright.*) This is the Southern known limit of this pine.

*Pinus Parryana* Engelm. Symmetrical tree, 20 feet high, trunk a foot in diameter. Forms extensive forests on dry mountains in Lower California, a few trees probably straggling across the boundary; a single one observed near Larken's Station June, 1890, in flower.

*Pinus monophylla* Torr. & Frem. Irregular tree, 30 feet high, the trunk 18 inches in diameter. Fls. June; Fr. Sept. Rocky cañons and ridges on the north side of the San Bernardino Mountains, from Cushenberry Springs to Cox's Ranch. Reported by Bigelow (Pac. R. R. Rept. iv, 15), from Cajon Pass, but not now found there.

*Pinus Torreyana* Parry. Sea coast hills at Del Mar, San

Diego County; until recently the only known locality for this species, but a second small grove has been discovered on Santa Rosa Island.

*Pinus ponderosa* Dougl. "Yellow Pine." Noble tree 200 feet high, with a trunk diameter of six feet. Fls. June. Ridges and slopes, or of a larger size on flats, at from 4000 to 11,000 feet altitude, throughout the San Bernardino Range, the San Jacinto and Cuyamaca Mountains, forming the greater part of the coniferous forest.

*Pinus jeffreyi* Balf. "Black Pine." Denser-headed tree, 75 feet high, the trunk 3 feet in diameter. Range of the last, usually on flats or near streams; scattered and not abundant, and probably absent above 8000 feet altitude.

*Pinus murrayana* Balf. Spreading tree 50 feet high, trunk-diameter, 2 feet. Grayback Mountain, scattered through the upper part of the yellow pine belt, between 10,000 and 11,000 feet altitude. (*Wright*.) A few small groups on low gravelly points at the lower end of Bear Valley, in the San Bernardino Mountains, at 6000 feet altitude.

*Pinus sabiniana* Dougl. "Sierra La Liebre, descending nearly to Antelope Valley." *Merriam*, N. A. Fauna vii, 336. This is the only authentic locality in the Southern counties. It has been reported (*Orcutt*, 1st Calif. For. Rept., 50) from San Diego County, but apparently erroneously.

*Pinus coulteri* Don. "Big-cone Pine, Bull Pine." Somewhat spreading tree, 50 feet high, trunk-diameter  $2\frac{1}{2}$  feet. Usually on dry ridges, less frequently on gravelly benches (*Mill Creek*), at from 5000 to 6000 feet altitude, in the San Bernardino and San Jacinto Mountains.

*Pinus tuberculata* Gordon. *P. attenuata* Lemmon, Min. & Sci. Press, Jan. 16, 1892; Gard. & For. v. 65; N. Am. Conebearers 10; *Erythea* i, 229. Sudworth U. S. For. Rept. 1892, 329. Coville Death V. Rept. 221. Regular and handsome tree, branched from the ground, 15 feet high, trunk, 8 inches in diameter. An interrupted belt, 5 miles long and one-half mile wide along the southern slope of the San Bernardino Mountains, at about 3000 feet altitude, from East Twin Creek to

City Creek. Reported by Sargent (10th Census ix, 194), from the San Jacinto Mountains, but this needs confirmation.

*Pseudotsuga macrocarpa*, Lemmon, 3d Calif. For. Rep. 134; W. Am. Coneb. 12; Sudworth, U. S. For. Rep. 1892, 330. Coville, Death Val. Rep. 223. *P. Douglasii*, Carr. var *macrocarpa* Engelm. Rather irregular tree 150 feet high, 4 feet in trunk-diameter. Bears light crops of cones, the reported fecundity perhaps exceptional. Throughout the San Bernardino Range from the Sierra Liebre east to Grayback Mountain, most abundant on the south slope, where it is usually scattered on the sides of cañons, between 2500 and 5000 feet altitude, but on Mount Wilson said to form "extensive forests" (McClatchie;) On the northern slope rare, and at higher altitudes; Gold Mountain, 7000 feet altitude. Also on San Jacinto Mountain, and in San Felipe cañon (type) between Banner and Julian. The technical characters of the species are weak, but it may perhaps be maintained for the sake of the difference in appearance and character of wood between it and its northern relative.

*Abies concolor* Parry, Am. Nat. ix, 304. Sudworth, Torr. Bull. xx, 42; *A. Lowiana* Lemmon, W. Am. Coneb. 14. Stately tree 150 feet high, 4 feet trunk-diameter. In cañons, on flats, or on ridges, scattered or in small groups, throughout the coniferous belt in the San Bernardino Range and the San Jacinto Mountains, at from 4000 to 8000 feet altitude.

*Sequoia sempervirens*, Endl. In the First Calif. For. Rep. 27, reprinted in 2d U. S. For. Bull. 201, a small grove of redwood is reported as growing in a remote part of the "Sierra Madre" Mountains of Los Angeles County. Mr. Abbot Kinney informs me that after a careful examination of the supposed location of the grove he has proved this report to be unfounded.

*Libocedrus decurrens* Torr. Handsome tree, 150 feet high, trunk 5 feet in diameter. Usually in cañons or on flats, scattered, at from 4000 to 7000 feet altitude, throughout the San Bernardino Range and the San Jacinto Mountains.

*Cupressus Guadalupensis* Watson. "Ravines near the Old Mission, San Diego, not abundant." (C. R. Orcutt, in lit.)

*Juniperus Californica* Carr. Small tree, 20 feet high, trunk

diameter 8 inches. Fls. February; Fr. September. Dry plains or hills, scattered, or occasionally in groves, at from 1000 to 3000 feet altitude, from the southern slope of the San Bernardino Range to the Coast Mountains (San Bernardino; Temecula). On the northern slope abundant and sometimes larger, scattered through the upper part of the *Yucca brevifolia* belt, between 3000 and 4000 feet altitude, extending from Cushenberry Cañon to the upper end of Antelope Valley.

*Juniperus occidentalis* Hook. Tree, 40 feet high, the trunk 2 feet in diameter. Northern side of the San Bernardino Mountains, at 6000 to 7000 feet altitude. Bear Valley; between Halcomb Valley and Green Lead, forming a considerable forest, unmixed with other coniferous trees.

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## NOTES ON LEPIDOPTEROUS LARVÆ.

BY C. H. TYLER TOWNSEND.

### I. LEPIDOPTEROUS LARVÆ WHICH BORE THE 'FLOWER-STALKS OF DASYLIRION.

Several lepidopterous larvæ were found May 18, 1892, in a dead flower stalk of *Dasyllirion wheeleri*, on Tortuga Mountain, which is on the Mesa about five miles to the southeast of Las Cruces, New Mexico. The stalk containing these larvæ was an aborted one, which for some reason had died when it reached the length of a foot and a half, but had still become hard and woody. Probably the death of the stalk was caused by the larvæ, which were found boring in tunnels inside its base, like coleopterous larvæ.

*Description of Larva.*—Length, 30 to 42 mm.; width of mesothoracic segment,  $6\frac{1}{3}$  to nearly 7 mm. Whitish, nearly naked, elongate, widest anteriorly (on mesothoracic segment), with three pairs of quite well-developed thoracic legs, and five pairs of distinct but aborted and approximated prolegs. Head and dorsum of prothoracic segment corneous, of a tawny brownish tinge; rest of larva fleshy. Head about one-half width of mesothoracic segment, base retracted within prothoracic segment, sparsely hairy on

February 7, 1894.

anterior portions. Antennæ three-jointed, first two joints cylindrical and of same length, basal joint about twice the diameter of second, third joint very small and short, second joint with a terminal bristle and an additional short one arising beside the third joint. Mandibles strong, faintly notched on apical edge, showing three distinct teeth. Maxillary palpi four-jointed, basal joint short and stout, second joint about same diameter but three times as long; third joint nearly as long as second, about one-half the diameter of latter, cylindrical; third joint minute. Labial palpi two-jointed, slender and elongate, basal joint tubercle-like and short; second joint elongate, not as thick, subcylindrical. Spinneret elongate and tapering to a point, longer than labial palpi. Prothoracic and metathoracic segments about equal in width, a little narrower than the mesothoracic. Abdominal segments a little narrower still, and about equal in width from segments 5 to 11; 12 and 13 gradually and successively narrowed, 13 with a transverse dorsal crease midway making it appear as 2 segments. Segments 2 to 4 (thoracic) about equal in length; 5 and 6 much shorter, nearly equal; 7 to 11 longer than thoracic, about equal, or 9 and 10 somewhat the longest; 12 and 13 shorter and nearly equal in length. A few hairs on dorsum of prothoracic segment, and on anal segment, very few on other segments.

Described from three specimens.

In the same stalk with the above there was also found a live lepidopterous pupa, which can hardly belong to the same species as the larvæ since it is so much smaller in size. It may be briefly described as follows:

*Pupa*.—Length, 16 mm.; width on thorax,  $4\frac{1}{2}$  mm. Elongate, pale flavous brownish in color; terminated anteriorly with a stout and short process, which ends in a point on a level with the ventral surface. Eyes at inferior base of this process. Antennal, leg, and wing sheaths reaching to fifth abdominal segment; antennal sheaths consisting of many short joints, gradually growing slightly longer and narrower toward end of sheath. Dorsal portion of each abdominal segment with an anterior transverse row of short, stout, sharp-pointed spines, their tips brown; and a posterior row of much smaller, more closely approximated and even spines. Anal segment is appar-

ently without this posterior row, but has instead a terminal circlet of spines of different sizes, a lateral one on each side much the largest and rather claw-shaped, with the point directed inferiorly. The other spines are much smaller.

Described from one specimen.

## II. LYCÆNID ON MESQUIT.

Four specimens of a beautiful light green lycænid larva were beaten, May 16, 1891, from *Prosopis juliflora* south of Mesilla, New Mexico. At the time of capture, they measured from 5 to 7 mm. long, and were of the exact shade of green of the mesquit leaves. They feed on the underside, thus escaping observation. The head, in these and other lycænid larvæ, appears to the naked eye as a small black tubercle on the ventral aspect of the cephalic end of the body, which with their other characters gives them much the appearance of certain dipterous larvæ.

*Description of Larva.*—Length (strongly curved), 4 to 7 mm.; greatest width, 2 to 3 mm.; greatest thickness, 2 mm. Quite similar in general outline and appearance to the lycænid on *Atriplex* described by the writer, from Arizona (Am. Nat. 1893). Differs only as follows: Light green in color, with a thick clothing of minute and more spinous tubercles, from each one of which springs a minute hair. With or without the median and lateral rows of reddish spots on segments 3 to 10 (two with and two without). One of the specimens, with the red spots, has also a more or less yellowish area on each side of the median row of spots. The dorsa of segments strongly or hardly at all produced into the raised transverse ridges (one strongly, two moderately, and one very faintly). Anterior segments gradually increasing in width, to segment 6, segments 6 to 10 about equal in width, posterior ones narrowing to anus. Some or none of the minute black spinous tubercles interspersed among the whitish ones (more in two cases—same two specimens referred to above as having the rows of red spots; and a considerable number along dorsal region in the other two). All four differ in having none of the short and stout black spines on anterior portion of dorsum



of prothorax, which instead is longer hairy especially on borders; moreover all the segments (except head) present a pubescent appearance, being covered with the short hairs arising from the spinous tubercles, these hairs usually (in three specimens—not in the faintly humped one) becoming longer on the dorsum along the median row of hump-like transverse ridges. The pubescence in these three specimens (above mentioned) also becomes somewhat longer along the sides of the larva. Head not so glabrous, black, but not so polished. Eyes apparently nearly the same. Mandibles apparently nearly the same. Legs and prolegs same; spiracles same, consisting of 9 pairs, on sides of segments 2, and 5 to 12, those on 11 and 12 situated more on dorsum of segments.

Described from four specimens. Southern N. Mex. General colors noted in life. It had occurred to me that possibly there were two species represented in the above larvæ, but their uniform pubescence and the connecting variations between them lead one to consider them as belonging to the same species. Their pubescence seems to point them out at once as distinct from the species on *Atriplex*.

Mr. W. H. Edwards has treated in a most interesting manner of the special organs of segments 11 and 12 in the larva of *Lycaena pseudargiolus* (Butt. N. Am. vol. ii. *Lycaena* ii, iii, pp. 10-16). A figure is given of the last segments (p. 14), showing these organs. All of the four larvæ above described from mesquit show the organs very plainly; the median transverse opening on 11, and the two tubes on 12 wholly withdrawn inside and showing as a rounded stigma-like organ with many wrinkles radiating from the centre.

### III. LARVA OF *OIKETICUS TOWNSENDI* (RILEY MSS).

This species is our common bag-worm in Southern New Mexico. Some detailed notes have been published on this species in the *Can. Ent.*, 1892, p. 199, under the name "*Thyridopteryx* sp." Specimens had been sent to Dr. Riley, who wrote me too late for insertion in the above-mentioned notes that the insect proved to be a new species of *Oiketicus*, which he would describe at some future time under the above name. The present seems an ap-

propriate time to publish the following description of the larva, which was drawn up some time ago.

*Larva.*—Length (after being much contracted in alcohol), 20 to 32 mm.; greatest width (7th and 8th segments),  $7\frac{1}{2}$  to  $10\frac{1}{2}$  mm. Black, naked except a few hairs on head and thoracic feet, head and thoracic segments corneous dorsally and variegated with whitish, rest of body fleshy. Three pairs of strong 3-jointed thoracic legs, each armed with a stout terminal claw; five pairs of prolegs, on segments 7 to 10 and 13. The lateral plates of dorsa of segments are hardly whitish, or faintly so anteriorly in continuation of the whitish lateral line of thoracic segments. There is also an inner lateral line on each side on each of the thoracic segments, and a median line on the prothoracic and mesothoracic only. The prolegs, with lateral portions of ventral surface, are also more or less whitish. Head is considerably narrowed, about half retracted within prothoracic segment. Antennæ 3-jointed, first joint very stout and subconic with a truncate apex, about as long as basal diameter; second joint very short and retracted within the basal joint so that it is not conspicuous; third joint slender and subcylindrical, nearly as long as basal joint but not more than one-third its mean diameter, terminated by a bristle nearly three times its own length. Maxillary palpi 4-jointed, basal 2 joints subequal, stout; third joint hardly as long and about one-half the diameter of second; fourth joint minute. Labial palpi slender, consisting of a basal elongate subcylindric joint terminated by a stout, pointed, bristle-like style about its own length, with a minute joint at its base. Spinneret elongate, slender, pointed. Labium with a deep notch on anterior margin, bristly. Mandibles very strong, strongly 4-toothed apically. Head is in younger specimens mostly whitish, only finely marked or speckled with blackish or brown. Prothoracic segment a little wider than head, fully or more than one-half as long as wide; mesothoracic segment wider than prothoracic but only one-half as long; metathoracic slightly wider than mesothoracic, and about same length, as is also the fifth segment (first abdominal), which latter is a little wider than metathoracic. Segments 6 to 11 very gradually increasing in length, 11 being the longest; 12 a little shorter and narrower; 13 a little long

and still more narrowed, with a transverse dorsal crease on anterior two-thirds, making it appear as two segments. In contracted alcoholic specimens the seventh and eighth segments are the widest; but in a fresher specimen the mesothoracic to eighth segments are about same width, 9 and 10 hardly narrower. Anal prolegs more developed than others.

Described from six alcoholic specimens, five, including the largest, collected March 15, 1891. Color noted in life.

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SOME NEW AND SOME OLD ALGÆ BUT RECENTLY  
RECOGNIZED ON THE CALIFORNIA COAST.

BY C. L. ANDERSON.

PUNCTARIA WINSTONII n. sp.

(Class MELANOPHYCÆ; Order DICTYOTACÆ.)

Fronds tufted, arising from a small naked disk, with very slender filamentous stipes, which gradually widen into tough, leathery, areolated lamina, thin, membranaceous,  $\frac{1}{4}$ -1 inch wide and 2-10 inches high, of a dark olive green color. Cells cuboidal or roundish. *Oogonia* and *tetraspores* in the same sori, the former spherical or pear-shaped. Hairs and paraphyses absent. Adheres well to paper, and in drying has a distinct odor of new leather. In the older plants there are perforations, erosions, and lacerations of the leaf.

For a long time I have wondered why species of *Punctaria* had not been discovered on our Coast. Last summer Mr. Harry B. Winston, a young and zealous collector of Algæ, found this species at Carmel Bay, growing on the old stems of *Egregia*. It seems closely allied to *P. plantaginea*, Roth., of the Atlantic Coasts in shape and color. It has probably been mistaken when young by collectors for *Phyllitis fasciata*, which it slightly resembles and which is very common. It differs from *P. plantaginea* in having spherical or pear-shaped oogonia instead of cuboidal, and in the absence of hairs and paraphyses. Probably it grows on the rocks and on other algæ than *Egregia*, but so far has only been found on that one plant. It grows in a sheltered cove near Chinese fishing huts on the north side

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of Carmel Bay where Mr. Winston and his parents have collected many novelties, and some of the most beautiful Algæ ever found on our Coast.

Prof. Farlow, who has examined specimens of this alga, is inclined to the opinion that it is the same as *Coilodesma Californica* of Ruprecht and Kjellman. *Coilodesma* is the old genus *Adenocystis* of Hooker and Harvey, Flora Antarctica. This may be so. But our plant seems to agree so well with the Dictyotaceæ and the genus *Punctaria* that I am inclined, notwithstanding differences in structure of frond and fruiting, to regard it as belonging properly as above indicated until *Coilodesma* is proven to stand in place of *Punctaria*.

*DESMARESTIA ACULEATA*, Lmx.

(Class, MELANOPHYCEÆ; Order, ECTOCARPACEÆ.)

This alga was collected at Moss Beach, near Pacific Grove, by Bradley M. Davis, in June, 1892. The long cord-like branches and even the main stems were covered with a fine growth of branching filaments. It does not seem to be abundant, as this "find" is the only one I know of. It is common on the Atlantic Coasts and has also been collected at Kamtschatka, on the north-west coast.

*DESMARESTIA VIRIDIS*, Lmx.

(*Fucus viridis*, Fl. Dan.; *Dichloria viridis*, Grev.)

This is a long known European alga, and was found on the Alaskan Coast, but was not discovered on the Californian Coasts so far as I know, until the summer of 1892, when Mrs. B. C. Winston collected it in Carmel Bay, adding this pretty alga to many other unexpected trophies found in the line of natural history on that beautiful bay.

*NEMALION LUBRICUM*, Duby.

(Class, RHODOPHYCEÆ; Order, HELMINTHOCLADIACEÆ.)

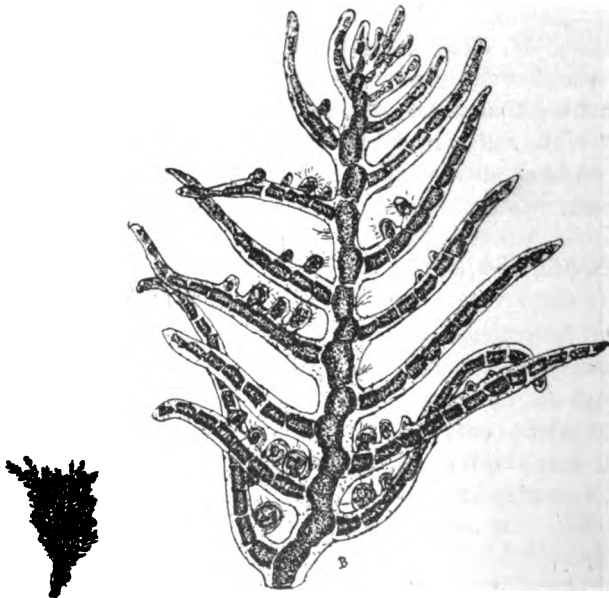
This long known alga, found in the Mediterranean and Adriatic Seas and on some Atlantic Coasts, has recently been discovered in Monterey and Carmel Bays. "Worms" is the common name in these localities, and very appropriately, for the

frond is so lubricous that it seems to creep until thoroughly dried. Our plant does not materially differ from the European except in being more robust. The fronds are mostly simple, occasionally branching dichotomously. I have only examined the cystocarpic plants, finding the fruit abundant, borne in the fan-shaped filaments near the surface of the frond.

*CALLITHAMNION RUPICOLUM*, n. sp.

(Class RHODOPHYCÆ. Order CERAMIACÆ.)

Fronds densely tufted, twisted, and matted at the base; alternately pinnate, pinnæ rather long and slender, distichous, emerging near middle of articulation; angles of axis obtuse. Tetraspores tripartite, oblong or obovate, borne almost always on upper side of ramuli, and near middle of articulation. The whole



*Callithamnion rupicolum*, n. sp.

A. Tuft of branches, natural size.

B. A magnified branch (about 500 diameters) showing the tripartite tetraspores. The fine hairs are probably a parasite, but nearly all the older plants are thickly beset not only with thin hairs, but many forms of diatoms.

plant is at times beset with very small radiating articulated threads (parasites?). Color reddish brown. A small alga  $\frac{1}{4}$ -1 inch high, forming in patches on rocks and sides of cliffs at high water mark.

It is with reluctance that I add another name to the long list of Callithamnions, now already numbering more than two hundred. But this little plant, so small, so abundant, is not like any in my herbarium; and finding no description of it, I venture to enlist it as new, having but little doubt.

It grows abundantly about Monterey Bay, and I have received a specimen from Mrs. Bingham, of Santa Barbara. It may readily be distinguished by the following characters: The tetraspores and ramuli emerge near the middle of the articulation; its small size; its perennial growth; its reddish brown color; and growing on rocks and sides of cliffs at high-water mark.

*BONNEMAISONIA HAMIFERA*, Hariot.

(Class, RHODOPHYCEÆ; Order, LAURENCIACEÆ.)

This unique and very pretty alga has but recently been described by Mons. Hariot coming from Japan. Professor Farlow of Harvard, has had specimens from Santa Barbara but for a time considered them the same as *B. asparagoides*, Woodw., of the Irish Coasts.

In 1892 Mrs. Winston, Bradley M. Davis, M. A. Howe, and others collected specimens near Pacific Grove. Plants having been sent to Professor Farlow he has kindly determined them.

In the March number of *Erythea* for 1893, Mr. Howe publishes this alga in a list of his collections on Monterey Bay. As he truly says, "it is beautiful and noteworthy." One of its striking features is remarkably well-formed imitations of *fish-hooks* at and near the tips of the branchlets, much like those of *Hypnea musciformis* but more graceful.

*DASYA COCCINEA*, Huds.

(Class, RHODOPHYCEÆ; Order, RHODOMELACEÆ.)

This beautiful alga has been collected in Monterey and Carmel Bays for some years; but until the summer of 1892 was not recognized as the old world *Dasya*, first described by Hudson in

*Flora Anglica* about the beginning of this century and named *Conserva coccinea*. Afterwards C. Agardh placed it in the genus *Dasya*.

I am indebted to Mrs. B. C. Winston of Pacific Grove for calling my attention to it, and for a specimen. It is by no means abundant, but serves as an example of the curious fact that many European Algæ which do not appear on our Atlantic Coast are found on our Pacific Coast.

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#### ON THE OCCURRENCE OF NYCTINOMUS MOHAVENSIS IN THE SANTA CLARA VALLEY.

BY J. M. STOWELL.

In the early part of last February the writer was informed by Mr. Edward M. Ehrhorn, Horticultural Commissioner of Santa Clara County, that the Court-house in San Jose was infested by large numbers of bats, which were taking refuge behind the iron window-shutters and disturbing the course of Justice by their constant chattering. A visit to the Court-house on February 27 showed that the state of affairs had not been exaggerated. On opening the leaves of one of the shutters, the bats were found thickly clustered in the darker recesses. They seemed extraordinarily clumsy and made little attempt to escape, only a few fluttering away after having fallen from their perch. About seventy specimens were procured and prove to be representatives of *Nyctinomus mohavensis*, with Merriam's rather meagre description of which (N. A. Fauna, 2, p. 25) they entirely agree. This species was described apparently from a single specimen procured at Fort Mohave, Arizona, March 8, 1889, since which no additional specimens seem to have been recorded. The present discovery of the species in the Santa Clara Valley gives a notable extension to its range.

We have been unable to compare *N. mohavensis* with the closely-allied *N. brasiliensis*, and Dr. Merriam neglects to point out the characters distinguishing the two species. Dr. Harrison Allen informs us that he considers both *N. mohavensis* and *N. femorosaccus* as at best geographical races of *N. brasiliensis*.

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As the first two, however, are described from essentially the same region, it would seem impossible to treat them as subspecies; and as our specimens without exception agree with *mohavensis* in the characters by which it is said to differ from *femorosaccus*, it seems best to recognize the two as valid species until further comparison is possible.

The specimens taken February 27 were all procured from the shutters of one window on the western side of the building, and consisted of males and females in about equal numbers. A second visit to the Court-house on March 3 resulted in the capture of sixty-seven additional specimens. Of these, thirty-two were taken from behind one shutter again on the west side of the building, and consisted, as before, of both sexes about equally represented. The rest of the second catch, thirty-five in number, were taken from behind four different shutters on the east side of the Court-house, and proved on examination to consist of females exclusively. This furnishes additional evidence that under certain circumstances the sexes congregate separately.

Several specimens of this bat have since been taken on the University Campus, and at the Hopkins Seaside Laboratory at Pacific Grove. We have also had the privilege of examining a specimen collected at San Diego, Cal., by Mr. C. H. Marsh. In this the lower incisors were 3-3, distinctly bilobate, and in general proportions, and shape of ear, it agreed with our specimens.

Le Conte has already called attention to the variation in the number of lower incisors in *Nyctinomus brasiliensis* ("*Rhinopoma carolinense*"), as out of fifteen individuals examined by him "one had no incisors on the lower jaw; two had five; three had four, and the rest six."\* The same variation obtains in *mohavensis*. Merriam describes the lower incisors as 2-2, not distinctly bifid. But the normal arrangement appears to be 3-3, all distinctly bilobate. Thus in forty-five specimens examined as to this character, 24 specimens have 6 lower incisors; 9 have 5, and 12 individuals have 4. The outer incisor when present is very small, and so crowded forward as to occupy a precarious position in front of the canine, a fact which may account for its

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\* Observations on the North American Species of Bats, John Le Conte Proc. Acad. Nat. Sci., Phila., 1859, page 431.



absence in so many specimens. In by far the majority, the incisors are distinctly bilobate and the lobes have well-rounded tips; but in some specimens the tips have become more or less worn, and in a few individuals this process has proceeded so far that the upper edges of the teeth are truncate, with scarcely a trace of the median notch. In the specimens examined we have noticed that most of those with perfectly truncate incisors have the latter also reduced in number. This probably indicates that both conditions are dependent upon age.

The upper lips are pendulous, and are crimped into seven or eight perpendicular folds; and the lower lips are heavy but not crimped. The color is sooty on upper surface, with the base of the hairs whitish. The ventral surface is lighter.

I give below measurements in millimeters of eleven of these specimens. It will be seen that they agree very closely with Merriam's type of the species.

Sex.	Total Length.	Length of head and body.	Length of head.	Ear from base of antitragus.	Ear from crown.	Height of tragus.	Tail to end of vertebrae.	Exserted part of tail.	Length of humerus.	Length of forearm.	Length of metacarpal.	Length of 1st phalanx.	Length of 2d phalanx.	Length of 5th finger.
♂	91	59	21	17	13	3	33	22	26	41	42½	16	15	41½
♂	94	59	22	18½	13½	3	34	22	27	43½	43	17	16½	42
♂	89½	57½	21	17	12½	3	30½	17	24	44	43	17½	17	43½
♀	89½	58	21	17	14	3	32	22	25	42	44	16½	15½	42
♀	94	59½	21½	18	13	3	32	19½	26	44	44½	17	16½	44
♀	92½	57	21½	18	12½	3	34½	22	24	43	44½	17	16½	43
♂	89½	57	19½	17½	12	3	33	18½	24½	42	42½	16	15	42
♂	93½	58½	20	17½	12½	3	33	19	25	42½	43½	17	16	44
♂	93½	59	20	17½	14	3	34	20	26	42	43	16½	16	44
♀	89	59	20½	17	12	3	33½	18	26	42½	44	16	15	43
♀	93	59	19½	16	13½	3	34	21	24½	41	43	16	15	42½

Zoological Laboratory, Leland Stanford Junior University, Jan. 12, 1894.

## TAR AND FEATHERS.

BY A. W. ANTHONY.

Anyone who has collected sea birds along the Coast of Southern California has doubtless noticed a peculiar soiled condition of many of his specimens, consisting of a sticky, black substance or black stain of greater or less extent, on the breast and sides, which is frequently of such extent as to render the specimens unfit for the cabinet. Loons, grebes, and fulmars

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seem to be the birds most effected in the region of San Diego, but all of the common species are apt to show black blotches at times. For a long time after the condition was first noticed I was at a loss to account to my own satisfaction for the origin. The theory that the birds had been feeding about the carcass of a whale or seal and gotten their plumage greasy from that or other sources was anything but satisfactory in view of the appearance of the stain and the species affected. Western grebes and Pacific fulmars—white phase—were sometimes seen with the entire lower plumage matted into a solid black mass, and not infrequently such birds were found dead on the beach. Whether their death was caused by the condition of their plumage I am unable to say, but from the appearance of some of the worst cases I should say that it probably had something to do with it.

As such specimens were so obviously worthless I have carefully avoided them, and until the present season my observations were limited chiefly to the living birds and those but little affected.

On July 11 of the present year, however, a *Puffinus griseus* was shot off San Diego and while the feathers of the left side and flank were glued together in a solid sheet it was by far too desirable to discard on that account, and an effort was made to save it, and after a liberal application of gasoline it was admitted to the cabinet minus a part of its plumage that was uncleanable.

This specimen—the first that had fallen into my hands in a condition suitable for examination—explained very clearly the mystery of the many stained plumages; it was due solely to a sticky, soft mass of asphalt.

I have frequently found small blotches of this substance varying from the size of a postage stamp to several inches or a foot in diameter floating about on the surface of the sea, evidently coming from some submarine source to the north, where the oil shales reach the Coast in the region of Santa Barbara.

This substance when it first comes to the surface contains enough volatile matter to render it about the consistency of molasses, and cause it to stick to anything with which it comes in contact. As the volatile gases escape it becomes hard and tough, encasing the bird that is so unfortunate as to swim into a floating mass in a coat more suitable for a turtle or armadillo than a member of the feathered kingdom.

## CONTRIBUTIONS TO WESTERN BOTANY VI.

BY MARCUS E. JONES.

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### I. THE NAVAJO BASIN.

I propose this name for that region, both botanically and zoologically interesting, which occupies Southeastern Utah, Southwestern Colorado, Northwestern New Mexico, and Northeastern Arizona, whose limits are fairly well defined by the Colorado River and its tributaries north of the entrance of the Grand Cañon (the junction of the Little Colorado and the Colorado) as far as the Book Cliffs on the north with a northern and narrow extension along the Green River at least as far as the base of the Uinta Mountains. Its western boundary is the base of the Coal Range (Wasatch Plateau of Powell) in Utah, the Henry Mountains, and the Buckskin Mountains on the southwest. Its eastern boundary is the high country east of Grand Junction, Colorado, extending thence east of south past the base of Mt. Sneffles and thence along the edge of the mesa country through Southern Colorado and south as far as Coolidge, New Mexico, thence following the base of the northern slope of the Mogollons and including the valley of the Little Colorado to the base of the San Francisco swell near Cañon Diablo and thence north to the Colorado River. This large and isolated region belongs almost wholly to the Upper Sonoran of Merriam, and is to be considered as a subdivision of that region with a fringe of the Transition group on its edges. It has been isolated since the Miocene Tertiary, or at least since the Pliocene with its present drainage, and has been surrounded on all sides by lofty and cold mountain barriers from 7000 to 10,000 feet in average height above the sea with the exception of a very narrow stretch of country only a few miles wide and about 5000 feet above the sea from Johnson, Ariz., and Kanab, Utah, to the Colorado River, which connects with the narrow belts along the rivers belonging to the Upper Sonoran. This narrow plateau belt below Kanab has very few plants that might be classed as Upper Sonoran, but is the lowest possible ingress to the basin except the precarious one along the dark gorge of the river itself where there is very little

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vegetation as whole, and no possible means of distribution of seeds except that of the wind and birds, the former quite strong and the latter very scarce. The elevation of the region is at its lowest along the river at or near Lee's Ferry, about 3000 feet above the sea, and is warm enough for figs, almonds, and possibly oranges; the upper end is at Green River, Utah (not Wyo), and Grand Junction, Colorado, a little over 4000 feet above the sea, and a most admirable place for grapes, peaches, etc. The rainfall will not average over ten inches and for the most part will not exceed six inches. The soil is a tenacious and very barren clay for the most part, though it is gravelly and sandy on the mesas bordering the region. The species of plants found peculiar to it so far are about sixty, possibly not so many; the species of mammals and reptiles, etc., so far found are about a dozen. There are a number of new insects, but I do not know just how many. The number of species that are identical with the Upper Sonoran of S. Utah and N. Arizona is not very great, but the general character of the life is Sonoran. The climate is very hot and dry; water is scarce except on the rivers which simply pass through the region. The region is almost uninhabited and never can support much life; game is scarce, and it is a veritable desert. The country is simply a great trough with branches, and is bordered with lofty cliffs of crumbling sandstones of Triassic age which make it a very difficult thing to traverse it except by long detours. At some other time I will try to give a list of the flora and fauna of the region, and show its relation to the surrounding ones.

## II. SOME NEW SPECIES.

*PHLOX ALBOMARGINATA* n. sp. Allied to *P. caespitosa*, densely matted flowering stems mostly simple, 1 to 3 inches high or none, erect or ascending, 1 to 3 flowered, usually 1-flowered; leaves 2 to 3 lines long, 1 to 1½ wide, rigid, spreading, acerose, ovate to lanceolate, usually the latter; general appearance light green, mid-rib narrow and not prominent, margins cartilaginous, thick, white, glabrous except the coarsely hispid ciliate base, inner surface (that inside the cartilaginous edge) dark green, rather loosely pubescent, with short, coarse, white hairs on both sides; internodes longer than the leaves, angular, white

pubescent, with the same kind of hairs; the leaves are in pairs, with fascicles of smaller ones in the axils; upper part of stems, peduncles, leaves, and calyx very glandular as well as pubescent with coarse hairs; pedicels stout, 2 to 4 lines long; calyx narrow, 4 lines long, tube with teeth  $2\frac{1}{2}$  lines long, the former 5-nerved prominently and the nerves with narrow green margins; calyx lobes very narrowly subulate, acerose, 1 to  $1\frac{1}{2}$  lines long, not spreading much; corolla purple or lighter, purple spotted at the throat, tube  $\frac{1}{2}$  a line wide at base and a line wide at apex, 1 to 2 lines longer than the calyx and teeth, lobes oval, entire, 2 lines long; flower 5 lines wide; stamens very unequally inserted, small, oblong, yellow; capsule  $1\frac{1}{2}$  lines long, exactly oval, obtuse, apiculate with the sharp vestige of the long (4 lines) style, the point of insertion of the capsule is very weak, and the capsule readily breaks away and falls off leaving an empty calyx; lobes of the style about  $\frac{1}{3}$  a line long; placental axis is triquetrous, with one large oblong seed attached by its inner face in each cell above the middle of the concave placental wall.

This unique Phlox in its foliage resembles *Galium Mathewsii* or *stellatum*. The glandular pubescence at once separates it from any other of its class. Sometimes the stems are absent and the single flowers arise from a rosette of very short (1 to  $1\frac{1}{2}$  a line) leaves, on pedicels 4 lines long and with a calyx only 2 to 3 lines long; corolla not reduced. This form I call var. *minor*.

East face of Mt. Helena, Montana, May, 1891. Rev. F. D. Kelsey.

ASTRAGALUS EASTWOODÆ Jones. *A. Preussii* var. *sulcatus* Jones "Zoe" iv, 37; as *A. Sulcatus* is preoccupied.

ASTRAGALUS HAYDENIANUS Gray. This rather pretty and very odoriferous plant is of late receiving fully as many synonyms as *A. lentiginosus*. In fact, every time it has been collected but twice it has received a new name. As I have shown in "Zoe" ii, 241, there is nothing to separate it from *A. bisulcatus* except its more slender habit and white flowers. For convenience I there separated two western forms of it as var. *major* (from Johnson, S. Utah) and var. *Nevadensis* (from Palisade, Nevada). Lately Mr. Greene visits my type locality and probably the very field

where I gathered the latter variety and describes it as *A. demissus*, then Mr. Sheldon, by the aid of the Index Kewensis, gives Mr. Greene's species a new name, *A. Jepsoni*, and my first var. another, *A. scobinatulus*. An examination of Mr. Greene's description shows that his specimens, though from the type locality of the var. *Nevadensis*, are pubescent and have unequal calyx teeth. As it is the fashion now to name everything in sight, I would suggest that the var. *Nevadensis* is fully as distinct as any of the other forms, and as the name is preoccupied (Index Kewensis) it is waiting for a brand new name and will be the property of the first man who gets into print.

Sometime botanists, when they get into the field, will learn that pubescence and comparative length of calyx teeth are slim foundations on which to hang species, in *Astragalus*.

ASTRAGALUS ARTEMISIARUM. *Astragalus Beckwithii* var. *purpureus* Jones "Zoe" iii, 288. Recent studies in the field make it reasonably certain that this is distinct from *A. Beckwithii*. The chief distinguishing characters are the purple flowers, rather cartilaginous pods with the interior filled with a watery juice and stipe with a fully formed joint near the middle. *A. Beckwithii* has ochroleucous flowers a dry and rather thin pod without watery juice and a joint in the stipe which is often reduced to a dark spot in the stipe which does or does not break at that point and generally irregularly.

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## THE DATES OF BOTANY BEECHEY, FLORA BOREALI-AMERICANA, AND TORREY & GRAY'S FLORA.

"FLORA BOREALI-AMERICANA W. Hooker.

This work came out in parts, but as was usual at that time no official statement was published as to the dates of publication. Consequent upon this, doubts as to the actual publication of many species therein contained have been rife. The following details may help to settle those questions:

Vol. i Part I, consisting of six sheets, pp. 1-48, came out in 1829 (cf. Linnæa, v, 1830, Litt. 102); and Seringe, *Bull. Bot.*, i (mars, 1830), 49.

Parts 2 et 3, p. 49-144 in 1830 (cf. Linnæa, vi (1831), Litt. 154).

Parts 4 to 6, end of vol. i in 1834 (cf. *Ann. sc. nat. Ser. II*, tome iii (1835), 100, "Livr. 3-7."

Vol. ii, Part 7 in 1834. See last note.

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The following dates are taken from the copy in the Library of the British Museum, as those when the respective parts were received by the Principal Librarian and denoted by stamping:

Part 8, pp. 49-96 in July, 1838.

Part 9, pp. 97-144 (same date).

Part 10, pp. 145-192, Jan. 1, 1839.

Part 11, pp. 193-241, Nov. 15, 1839.

Part 12, pp. 241 to end, July 8, 1840."

—B. Daydon, Jackson, in *Bull. Herb. Boissier*, i, 298 (1893).

"The copy of Torrey & Gray [Flora of North America] in the library of the British Museum, Bloomsbury, is in its original buff paper wrappers, and from this I can submit the following statement as accurate, so far as the dates are correctly set out on these wrappers:—

Vol. i., Part 1, pp. 1-184, July, 1838.

Part 2, pp. 185-360, October, 1838.

Part 3, pp. 361-544, June, 1840.

Part 4, pp. 545-698, Index (711), Title, etc., pp. xiv., Errata, June, 1840.

Vol. ii., Part 1, pp. 1-184, May, 1841. The wrapper has no printing on it, but I have taken the date from *Silliman's Journal*, xli. (1841), p. 275.

Part 2, pp. 185-392, April, 1842.

Part 3, pp. 393-504, February, 1843.

No more issued.

The case of Hooker & Arnott [Botany Beechey] is not so easy, for I have not succeeded in finding any copy with the original wrappers, and the following dates can only be taken as probable. If any reader of the *Journal of Botany* has access to such a copy, and would communicate to me the actual printed dates, I should be extremely obliged.

There is no difficulty in ascertaining the date of the first part, as several announcements concur; thus in *Linnaea* the issue is given as containing pp. 1-48, with ten plates, and came out in 1830. As I have failed to find more than occasional allusions during the progress of the work, I have pieced together all such indications, and assuming that each part was of the same dimensions as the first, I have referred to Pfeiffer's *Nomenclator* for the dates of all new genera as below, as the dates therein given must have been gathered from some copy:

Part 1, pp. 1-48, in 1830 (as above).

Part 2, pp. 49-96, in 1832 (*Pterochilus*).

Part 3, pp. 97-144, in 1832 (*Adenostoma*).

Part 4, pp. 145-192, in 1833 (*Layia*; see also Torr. & Gray, ii., 392, in confirmation).

Part 5, pp. 193-240, in 1836 (*Anisopappus*).

Part 6, pp. 241-288 (no indication of date, owing to the absence of any new genus).

Part 7, pp. 289-336 in 1840 (*Heterocentron*, etc., and several cited by Endlicher in that year).

Part 8, pp. 337-384. in 1840 (*Atinia*, etc.)

Part 9, pp. 385-432, in 1841? (*Grayia*, etc., cited by Endlicher in 1842).

Part 10, pp. 433-(486), in 1841 (*Sinclairia*).

The latter half of the work is especially open to doubt, for *Silliman's Journal*, xxxix. (1840), pp. 172-3, states that parts 9, 11, and 12 came out in 1839 or 1840, the twelfth being the conclusion; and, if correct, this shows that the latter parts were not of the same dimensions as the first part. It is in this direction that I seek for further information from any Botanist or Librarian who can enlighten me."—B. DAYDON JACKSON, in *Journal of Botany*, Oct., 1893.

The following extracts from Silliman's *Journal* show the approximate dates of the concluding parts of *Botany Beechey* and the *Flora Boreali-Americana*. It must be remembered, however, that communication at that time was not so frequent and so rapid between Europe and America as at present, and that we have no means of knowing how long the papers were in the hands of the editors.

*Hooker and Arnott, the Botany of Capt. Beechey's Voyage, etc., Part ix., 1840. (London).*—This work has extended to four hundred and thirty-two quarto pages, and another fasciculus will perhaps complete the work, but of this we are uncertain. The number of plates already cited is ninety-nine, of which eighty-nine are published. \* \* \* —*Silliman's Journal*, xxxix, No. 1, 172-3, April-June, 1840.

*Hooker and Arnott's Botany of Capt. Beechey's Voyage; part 10, 1841 (tab. 90-99).*—The tenth and last fasciculus of this work concludes the account of a collection on the Pacific coast of Mexico, and is terminated by a complete index. The ten plates it comprises are nearly all devoted to Californian plants described in prior fasciculi; among which *Pterostegia*, a curious Polygonaceous genus, *Anemopsis Californica* of Nuttall, and *Lophochlaena* of Nees, a singular grass, are the most remarkable.—*Silliman's Journal*, xli, 374, July-Sept., 1841.

*Hooker, Flora Boreali-Americani, or the Botany of the Northern parts of British America, etc., part xi., 1839. (London).*—The eleventh part of this work has just reached us; and as the twelfth and concluding portion may soon be expected, we hope to give in the following number of this *Journal* a more particular notice of Sir William Hooker's most important and extensive labors in North American botany. For the present we may merely state that the eleventh fasciculus comprises the Orchideous, and the Irideous and Cyperaceous plants, and a portion of the grasses. \* \* \* —*Silliman's Journal*, xxxix, No. 1, 172, April-June, 1840.

*Hooker's Flora Boreali-Americana, or the Botany of the Northern parts of British America, 2 vols. 4to. 182-940.*—The twelfth part, which contains the



remainder of the grasses, the ferns, and the small orders allied to the latter, brings this important work to a conclusion within the limits prescribed.  
 \* \* \* This fasciculus contains twenty plates (making the whole number 238). \* \* \* —*Siliman's Journal*, xl, 173, Oct.-Dec., 1840.

## THE LAST LETTER OF DR. GRAY.

SUNDAY EVENING, November 27, 1887.

DEAR DR. BRITTON—I wish to call your attention either in a personal way or in the "Bulletin," if preferred, to a name coined by you on the 23d page of this year's "Bulletin."

"*Conioselinum bipinnatum* (Walter, Fl. Car. under *Apium*), Britton. *Selinum Canadense*, Michx., 1830."

I want to liberate my mind by insisting that the process adopted violates the rules of nomenclature by giving a superfluous name to a plant, and also that in all reasonable probability your name is an incorrect one.

Take the second point first: On glancing at the "Flora of North America," of Torrey and Gray I, 619, where the name *Conioselinum Canadense* legitimately came in, you will notice that the name *Apium bipinnatum*, Walt. is not cited as a synonym; also that the synonymous name of *Cnidium Canadense*, Spreng., is cited with "excl. Syn." This *Apium bipinnatum*, Walt., you might gather was one referred to. Sufficient reason for the exclusion by Dr. Torrey might have been that Michaux's plant was a cold northern one, which nobody would expect in or near Walter's ground—the low and low-middle part of Carolina. Besides, the preface of that Flora states that Walter's herbarium had meanwhile been inspected by Dr. Torrey's colleague, who may now add that the *Apium bipinnatum* is not there. So that the name you adopt rests wholly upon a mere guess of Sprengels, copied by De Candolle, dropped on good grounds by Torrey, but inadvertently reproduced in Watson's "Index," copying De Candolle. I suppose you would not contend that a wholly unauthenticated and dubious (I might say, doubtless mistaken) name, under a wrong genus, should supersede by its specific half a well-authenticated and legitimate name. And I am sure that you will not take it amiss when I say that very long experience has made it clear to me that this business of determining rightful names is not so simple and mechanical as to younger botanists it seems to be, but is very full of pitfalls. I trust it is no personal feeling which suggests the advice that it is better to leave such rectifications for monographs and comprehensive works, or at least to make quite sure of the ground.

We look to you and to such as yourself, placed at well-furnished botanical centres, to do your share of conscientious work, and to support right doctrines. So I may proceed to say that, upon the recognized principles since the adoption of the Candollian code, your name of *Conioselinum bipinnatum*, even if founded in fact, would be inadmissible and superfluous.

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By a corollary of the rule that priority of publication fixes the name, taken along with the fact a plant-name is of two parts, generic and specific, it follows that in any case *Conioselinum Canadense* is the prior name for those who hold to the genus *Conioselinum*. I have laid down what I take to be the correct view as to this, in my "Structural Botany," paragraph 794, where it is supported by the high authority of Bentham. I believe it is more and more acceded to by the most competent judges. There are those who make transpositions of divorced halves of plants' names, and who also make the law of priority mechanically override other equally valid laws without regard to sense. To such the old law maxim of the elder De Candolle was applied—*summum jus, summa injuria*. If you like to adopt their ideas, you have at hand a still older, the very oldest, name, namely *Conioselinum Chinense*, for I can certify that the plant we are concerned with is *Athamantha Chinensis* of Linnaeus.

Very truly yours,

ASA GRAY.

The following comments from the *Journal of Botany* (London), may be of interest.

["In this *Journal* for 1892, pp. 254, 318, reference was made to a letter—the last written by Asa Gray—which, owing to circumstances not very clearly related, had never been published. The volume of the *Letters of Asa Gray*, just issued by Messrs. Macmillan, contains the document in full, and we here reproduce it.

"The circumstances connected with its writing and subsequent non-publication require to be stated: That Asa Gray was willing it should be published, the letter itself makes clear; that he considered it important is plain from the passage in the *Letters* which introduces it: 'On Sunday [Nov. 27] his pulse and temperature had improved so much that he was allowed to get up and go down-stairs at noon, the doctor congratulating him on the success of the treatment. There seemed a weakness of the right hand, which, however, passed away, and he wrote that evening the letter to Dr. Britton, which follows, and when remonstrated with for making the exertion said 'it was important, and must be written.' He died on the 2d of the following February.'

"Mankind has always attached a special interest to the last utterances of great men, and it might have been supposed that Dr. Britton would have hastened to avail himself of the permission expressly given by the writer to publish in his *Bulletin* the last contribution ever made by Asa Gray to the literature which he had enriched for so many years. So far, however, was this from being the case that it was not until Gray's fellow-worker himself lay on his death-bed that any knowledge of its existence was made public. Sereno Watson, in his last illness, dictated for the *Botanical Gazette* some remarks 'On Nomenclature,' which appeared in that journal for June, 1892, and which contain the following passage: 'I must express surprise that Dr. Britton has not considered it his duty to publish the last written words of Dr. Gray which were addressed to him upon this subject, and which

expressed his positive opinions upon this point.' We called attention to this in our Journal (1892, 254) in these words: 'When, in the exercise of our editorial discretion, we withheld from publication a subsequently printed note by Dr. Britton on this subject, he did not scruple to say [and to publish] that this was because we were "apparently afraid of the argument therein contained." We shall await with interest Dr. Britton's statement of the reasons which have induced him to suppress the last utterances of America's greatest systematist.'

'Dr. Britton's explanation appears in the *Botanical Gazette* for August, 1892, p. 254. He speaks of the letter as 'personal,' and, having admitted the accuracy of Dr. Gray's correction as to nomenclature, proceeds: 'The letter did not come to me as editor of the *Bulletin* of the Torrey Botanical Club, for I was not then editing that journal. I did not realize that it was intended for publication, and do not think that it was.' Moreover, having sent the letter to Cambridge, in accordance with a request, and having accepted a copy in exchange, he 'certainly never had any right to publish it after it had passed from [his] possession.'

"Commenting on the above, we said (*Journ. Bot.*, 1892, 318): 'These reasons may or may not be considered satisfactory, but we think that all botanists will regret that Dr. Gray's last utterances on a subject in which he is known to have taken a special interest were not made public.' These utterances are now before botanists, who must form their own conclusions as to the motives which have hitherto prevented their publication.—Ed. *Journ. Bot.*']"

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## SYSTEMATIC BOTANY.

BY MARCUS E. JONES.

To my mind the proper definition of the Systematic Botany, of the day and for the most part, is The Study of dried Plants in a few isolated localities remote from the Home of the Plants. This kind of scientific work is systematic and botanical, but it is not within gunshot of Systematic Botany. To claim that it is the real thing requires as much assumption as when the zoologists arrogate to themselves the term biology or natural history.

For a long time it has been the custom of western botanists to provide themselves with the necessary literature and then study their home plants, naming such plants as accord with the descriptions given, the rest they send with such notes as they consider valuable to certain persons in the East who have been regarded as authorities. The authorities compare them with the types of species or with their notions of the types, and if

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the plants do not vary too much from the species are considered the same and so named; if they deviate too much, then they are erected into new species, usually on the strength of a single specimen. The authorities put down what they consider specific characters and omit all mention of what does not strike their fancy as specific. Believing that brevity is the soul of this branch of Systematic Botany they write a few words, only a line or two if possible, and call it a concise description. The notes of the field botanist they usually have dismissed (till very recently) with a remark like this: "Flowers said to be white, but they appear to be yellow." If the field botanist has been so bold as to write out a full description of the real characters, the closet botanist will cut out all except those which strike his fancy and are found in the specimen before him, and will add such as he thinks have been overlooked by the field botanist. At last when the description is published the weary field botanist goes out into the home of the plants, where perhaps there are acres of them, and he finds that his description does not describe and is only an aggregation of meaningless words. If he becomes disgusted and writes back as I did once, complaining, he may get the reply which I received from one of the three great botanists who have recently passed away, saying: "I suppose that by this time you have learned that it is impossible to grow plants to fit the descriptions." It struck me that it was about time to grow the descriptions to fit the plants. Of late this kind of thing has become a nuisance, and field botanists have taken to describing their own species. For a time certain drastic measures were employed to prevent it, but these having failed, the botanists are now appealed to not to publish till they have seen the allied types in the East, a thing which every western botanist agrees to most emphatically if by any means he can see the types, which is not often, for with his field knowledge he could tell quickly what are valid, distinguishing characters in his proposed new species, while from the descriptions of old types alone no man could do more than guess what the real characters are in hundreds of species.

The occasional republication of an old species by a western man is pointed to as "an exasperating blunder," as "maddening," but, dear me, that does not begin to express our feelings

when we see a new monograph from men who would not know their own new species if they saw them alive, and we find them bristling with botanical sports as new species, sports which field study would have avoided. A certain genus recently monographed I tried to use and found that I had to open a seed vessel on every plant that grew in a certain patch and all manifestly from the same seed; out of the patch I had to make about three species. Some years ago I had the same laughable experience in patches of *Bæria* in California, also in patches of *Layia*; and two years ago I had the same experience with *Townsendia*, out of which I had to make two species from the same seed, and had a quantity of nondescript material left still waiting to be christened. There are dozens of genera that are as badly tangled as these.

I think this confusion has arisen primarily from the absence of field study on the part of the author of the species, and secondarily from carelessness in describing species, coupled with a false theory that paucity of words is conciseness. The most concise botanist of the last generation was the one who used the most words in describing his species, and the most verbose were the ones who seemed to delight in what they called "short and concise" descriptions, which have proved to be only epitaphs of unknown species buried in their herbaria, and which we western men now and then duplicate from no fault of ours. In the first place, few of us can afford to go East to find out what these species are like, and in the second place, we are not responsible for the sins of our botanical fathers and grandfathers who have caused this state of things. That we have kept up with the literature of the day and have used every means in our power to avoid mistakes goes without saying, and some of us have even gone East to study types, but it is a hardship that should not be required of us. Let the closet botanist first describe his own species so that they can be recognized by the descriptions alone before he attempts to make new ones for the field botanist, else he will cause to become a conviction what is now arising as a suspicion that imperfect descriptions are not due wholly to ignorance. If it is not possible to get accurate descriptions of western species made by closet botanists, then eastern botan-

ists who make new western species should be required to deposit types in some central place in the West where they can be examined.

There are four well marked fields in Systematic Botany in this country at present. The first is closet monographing which is all the rage, and which so far has had one fundamental defect, the lack of accurate descriptions of the actual types of the species enumerated. In place of this we are given what the author considers to be the real species as it exists in nature which may vary much from the actual type as it is found in the type specimens. This is well enough as far as it goes, and would be all sufficient if the flora were fully known, but it is not known in the West, and as a rule the monographer himself would hardly recognize his own species if he were to see them in the field, for as a rule field study is a minus quantity with him. A person might as well try to become an expert in geology without ever going out of doors as to become an authority on species by studying dried weeds. The second field is real field work occupied in the West by an increasing number of good botanists. The third field is tinkering with nomenclature, in which there are many of every shade of opinion, but all bent on getting some castiron rule in the name of botanical justice which will be just to all and injurious to none, but which when adopted will be unjust to nearly everybody, will elevate to notoriety by-gone botanists whose descriptions were for the most part a botanical farce, and will attach the names of some present botanists to hosts of species which they never saw, and to hosts of others that were created before they were born, and nearly all of which species were recognized and placed in their proper places in the vegetable kingdom by others alone. The fourth field is the accurate description of known species; this is practically unoccupied. If a score of our keenest eastern botanists would partition out among themselves the species of plants whose types are in this country and accurately and minutely describe them just as they are, arranging the species in such a way as not to duplicate parts common to several (by the use of keys), they would earn the everlasting gratitude of all botanists, cover themselves with honor, and give to our branch of science a standing for thorough-

ness which it now sadly lacks, and an impetus which would result in the speedy settlement of the classification of our flora.

The most crying need of to-day is a rule that no species shall be considered as published if it has a string of words attached to it which do not describe the species so that it can be recognized without the use of the type specimen. It is true that this would invalidate the names of almost half of our flora if it were made an *ex post facto* rule, but we need not do that; we can forgive the good old men who have passed away, but we should expect better things of the living. Among the faults in describing species there is no one more common than sawing the air with descriptions. Take *Astragalus* for example, allied species, one is described as "matted, pod inflated, flowers white, calyx long, stipules connate, leaflets 10-15 pairs." Another is described as "stems many; pod hoary, 2-celled, pointed; flowers large, keel blunt; calyx hyaline with teeth as long as tube; stipules lanceolate and acute; leaflets glabrous, obovate, acute." The person who makes such a description which would apply equally to either species thinks he has described his plant, when in fact it is only an aggregation of words with no meaning. If a person does the best he knows how he is then liable to miss some things of importance, but when he starts out to give a "short and concise" description and throws in a pinch of words and calls it a description, he feels aggrieved if he is called to account, and tries to insinuate that his critic has some personal motive for his "unjust attack!" When all the species are known it is perfectly right to omit all things of no importance, but when they are not all known and their importance misunderstood there is no botanist either with inherited or acquired acumen who can tell what are essential and what non-essential characters, and it is pure pedantry to assume it.

Another innovation in nomenclature which I think should not be overlooked is the crediting of species to men who were not their authors. I do not know who first promulgated it, but it is in the line so much cultivated of late, of ignoring and underestimating the work of field botanists. One would think the way things are going that the only persons who have any rights are the people who sit in their warm and cozy herbaria and manu-

facture species which other men have sent them at great expense of health, time and money. The hardships of field collectors are very great and so far as I know not a single man has made anything more out of it than a poor living to say nothing of profit, and when such a man names a species after having studied it in the field and then sends it on to some authority in the East with its name, and in order not to have a rupture with that authority lets him publish it for him, it is an outrage to rob the field botanist because he did not actually pay for the printing or write the words attached to it. If we are to go behind the printing as some would have us do and attach not the name of the real author of the species but the one who ostensibly published it, then another question would arise as to whether the words credited to the man who published the species were actually written by him or some clerk in his office, in that case the clerk should have the honor of the name. But what will be the result of such an innovation? Douglas' species will all be taken from him, Nuttall's are in the same condition, though they are put in quotation marks he never published them, but Torrey and Gray did. It seems to me that these notions of nomenclature are becoming more and more technical and equally unjust and will not be accepted by the majority of botanists who want to see due credit given to those who have earned it by their labor. We are losing the meat of nomenclature in the rubbish of formalism. No *ex parte* rules adopted by a few botanists will ever secure uniformity in American botany, nor will any rules stand long which ignore the rights of collectors.

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## NOTES FROM THE GRAY HERBARIUM.

BY M. L. FERNALD.

*HABENARIA LUCÆCAPENSIS*, n. sp. A foot and a half high, leafy; principal root tuber-like, an inch long, with numerous accessory fibres from the summit: leaves thin, broadly elliptical, obtusish, four inches long, half as broad, rather abruptly narrowed to a sheathing base; the lowest smaller, orbicular; the upper reduced to lanceolate acuminate bracts, an inch in length: raceme

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six inches long, 8-10 flowered: upper sepal ovate-orbicular, cucullate, about three lines in length; the lateral ones ovate-elliptic, obtusish, four lines long: petals deeply two-parted, upper segment linear, falcate, obtuse, dilated at the base, ascending, nearly equalling the sepals; lower segment filiform, about an inch in length; labellum three-parted to the base; the outer segments about fifteen lines long; the middle one linear, obtuse, a third to a half as long; spur clavate, free, 14-17 lines in length: ovary angled and obsoletely winged, about equaling the bracts; the two appendages of the stigma deeply bifid; the segments linear, spreading laterally, and curved ascending, retuse.—Collected on mountains of the Cape Region of Lower California, by T. S. Brandegee, September 16, 1893.

A stout species resembling in habit *H. Michauxii* Nutt., of the Southern States, but differing in its broader leaves, longer segments of petal and lip, and shorter more clavate spur.

*ALLIUM ACUMINATUM* Hook. var. *CUSPIDATUM* n. var. Scape more slender than in the type: perianth segments *oblong*, *abruptly cuspidate*, about the length of the stamens: bulb-coats more finely and less distinctly reticulated.—Collected at Wawawai, Washington, June, 1892, by Mr. W. R. Hull (No. 619).

Professor Porter's No. 74, from Weber River Valley, Utah, seems to be a form near this, but with the perianth segments tapering more gradually to the point, and with the stamens mostly short as in the type.

*TRIFOLIUM GRACILENTUM* Torr. & Gray, var. *INCONSPICUUM*, n. var. Much smaller than the type, slender, 2-6 inches high: leaflets 3-4 lines long, on petioles  $\frac{1}{2}$ -1 $\frac{1}{2}$  inches long: heads 3 lines high; corolla shorter than or barely equaling the calyx.—, Roadside, San Bernardino, Cal., Parish No. 2647.

Forms of the type approach this in habit, but the corolla is conspicuously longer than the calyx, as Orcutt's No. 1004 from Tia Juana, Lower California, and Palmer's No. 583 from Wickenberg, Arizona.

## PHYLLOSPADIX, ITS SYSTEMATIC CHARACTERS AND DISTRIBUTION.

BY WILLIAM RUSSEL DUDLEY.

The genus *Phyllospadix*, Hook., was founded on plants collected by Dr. Scouler, at Dundas Id., Columbia River, and was published in Hooker's *Flora Boreali Americana*, vol. ii, p. 171, London, 1838. These plants were pistillate specimens of *Phyllospadix Scouleri*, W. J. Hooker, although the author makes no mention of the dioecious character of the genus and perhaps was unaware of it, as he observes that the genus "is separated from *Zostera* by the single style, capitate stigma, and curious leafy border of the spadix." Not only does he make no mention of anthers but in his figures (tab. 186) are shown an ovoid ovary, the "single style and stigma," the pistils in a single row, and the retinacula forming the "leafy border of the spadix" spreading if not recurved. The spadices and pistils of his specimens must have been imperfect, for his correct figure of the plant itself enables us to know the particular form of *Phyllospadix* he was dealing with, and in all the specimens of this form collected along the Pacific Coast and examined by ourselves, as well as in the still more numerous specimens of *Phyllospadix Torreyi*, Wats., we find a cordate sagittate ovary, with two laminated stigmas, two rows of pistils, and the retinacula of the pistillate spadix never reflexed or spreading.

Since its first publication a diagnosis of the genus has naturally appeared in other works, among them the following general systematic treatises:

Watson, *Geol. Survey of Cal., Botany*, ii, p. 192, 1880. Ben-  
tham and Hooker, *Genera Plantarum*, iii, p. 1017, 1883. Engler  
and Prantl, *Die Natuerlichen Pflanzenfamilien*, ii. (1) p. 204, 1889.

Some of the omissions have been supplied—the most important being the dioecious character of the flowers,—and some of the errors have been corrected, but not all. As an example, figure B. (after Ruprecht) in Engler and Prantl ii, p. 204, is similar to Hooker's original figure of the spadix and ovaries, excepting that the two stigmas are shown. Fig. A. (also after Ruprecht) is not so good as Hooker's, not resembling the plant

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as it appears in the water. The original figure opposite, on p. 205, purports to be of *P. Scouleri*, but is a drawing of the form known as *P. Torreyi*, made from an herbarium specimen evidently. The drawing of the roots, root-stock, leaf-sheaths, ovaries, as well as the extraordinary number of fruiting nodes are all uncharacteristic. Prof. Ascherson's characterization of this genus and *Zostera*, in the text, is however thoughtful, and correct so far as the morphology of the genus was at that time ascertainable.

In making a critical biological study of the genus, its morphology and anatomy, during the past year, for the purpose of ascertaining its relationship to *Zostera*, and the possible causes, under the peculiar climatic conditions of this Coast, of its evolution as a genus, I came upon certain important structural characters which had remained undescribed, and was enabled to clear away some existing misapprehensions.\*

In the light of this study it has seemed desirable to recast the generic description of *Phyllospadix*.

PHYLLOSPADIX, W. J. Hooker.

Submersed marine plants growing along exposed shores, from low-tide level to two fathoms below, with long, grass-like leaves, and creeping, much-branched rhizomas, which cling to rocks or to a rocky substratum in sand.

Rhizoma brittle, somewhat compressed from above, its greatest diameter from .5 to 1. centimeter, nodes not well-marked, the whole branching, extending indefinitely, and irregularly knotted when old.

Roots short (2-4 cm.) stout, simple, six, eight or rarely ten, in a double row on the side of each internode, alternating right and left, in successive internodes.

Branches are on the side of each internode, opposite the clusters of roots, and on alternate sides, in successive internodes; young branches very leafy.

Leaves, .5 to 2 meters long, slender, numerous, mostly arising from the terminal bud and from short sterile branches of the rhi-

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\* See *The Genus Phyllospadix*, by William Russel Dudley, in the Wilder Quarter-Century Book, Sept. 1893, pp. 403-420, two plates.

zoma, and concealing the ascending flowering branches. Leaf-sheaths long, open as in Gramineæ, but each nodal leaf-sheath completely investing the rhizoma and the distal terminal and lateral buds. All nodal sheaths on rhizoma and flowering branches rent by the expanding buds, leaving only the thicker portion to support the lamina. Laminæ, linear, emarginate at the apex, smooth, 3-nerved, furnished when very young with "fin-cells," along the margin. Ligule short of two auriculate appendages.

Flowering stems ascending as lateral branches from the rhizoma, slender, naked below. They are from one-third to two-thirds of a meter to the summit of the upper spathes, and are continued to the height of a meter or more by means of the leaves and leaf-like tips of the spathes. Flowers without perianth, diœcious, arranged in a double row, on a spadix which is sessile within the spathe, but short peduncled below. Pistillate spadices in the axils of the stem-leaves and five or six centimeters in length. Staminate plants infrequent, their spadices shorter. Spadix linear, flattened, somewhat channeled, provided along each margin with a row of oblong, obtuse, incurved, obliquely ascending, chartaceous appendages (retinacula), one for each ovary or pair of anther-cells, the whole closely invested when young by the membranous spathe. The acute apex of the spadix usually projects slightly beyond the spathe proper.

Ovary cordate-sagittate affixed near the base to the spadix and terminated above by a very short style, and two thin, acuminate, irregularly-lobed stigmas which are soon deciduous. The ovaries of each row ascend, point obliquely inwards, and alternate with a pair of rudimentary anther-cells, appearing when young like the monœcious spadix of *Zostera*. At anthesis the stigmas only project from the spathe. The spadix and ripened pistils free at maturity from the spathe, but its retinacula never spreading or reflexed. Ovule single, pendulous and orthotropous.

Each anther, a pair of oblong linear very distinct lobes pointing obliquely upward and inward along the face of staminate spadix, the apices of each row closely adjusted to those of the opposite row. Anthers maturing in acropetal order, the male retinacula at the same time successively and permanently recurv-

ing, leaving the anthers exposed, and finally shedding the entire spathe. Anther-lobes dehiscent longitudinally, the septum between the two loculi persistent and membranous. Pollens filamentous, one-half to one millimeter long, floating on the surface of the sea, when first escaping.

Fruits compressed, beaked above, sagittate lobed below, seed coats loose and membranous. Embryo compressed consisting largely of an orbicular hypocotyl, 2-lobed posteriorly. Cotyledon thin, oblong descending between the hypocotyl lobes.

Sclerenchyma tissue abundantly developed in the flowering stems and the leaves, wanting in the rhizoma.

The genus differs from *Zostera* in habitat, number, size, position, and character of roots and lateral branches, in the rhizoma, the presence of sclerenchyma in the upright stems and leaves, in the dioecious spadices, in the rudimentary anthers on the pistillate spadix, in well-developed retinacula, form of ovary and hypocotyl, mode of dehiscence of anther, and the presence of a permanent membrane between the loculi of the anther-cells.

*P. serrulatus* Rupr., with "leaves toothed," from Alaska, may be at present dismissed as too little known, the description being based, it is said, on leaf-fragments only. Our California species approach too closely to one another; *P. Scouleri* being variable, while *P. Torreyi* is pretty constant in its characters; but from our present knowledge it would appear proper to retain them as species.

The following species are the only ones detected on the coast of California, and the only ones certainly known to exist:

*P. SCOULERI*, Hook., *Flora Bor. Amer.* ii, p. 171 (1838). Flowering stems not common, peduncles short, 1 to 6 cm. long. Pistillate spadix one; rarely two are present, one at each node. Ripened pistils larger than in the following species. Leaves flat and much thinner and lighter green, but with more sclerenchyma than in *P. Torreyi*; variable in width,  $1\frac{1}{2}$  to 2 mm. in mature plants, 3 or even 5 mm. on young sterile specimens; sterile plants abundant, growing on the rocks in the heaviest surf and on the most exposed ocean shores. Specimens examined from Tillamook Head, Or. (Henderson), from the mouth of the Rus-

sian River, Santa Cruz, Pacific Grove, and San Luis Obispo Bay, Cal. (Dudley). Reported from Vancouver (Macoun), Columbia River (Scouler), Santa Barbara (Mrs. Bingham).

*P. TORREYI* Wats., Proc. Amer. Acad. xiv, p. 303 (1879). Flowering stems abundant, elongated, usually 20–30 cm. to the lowest of the two to four fertile nodes. Pistillate spadices two to five at each node, a cluster terminating the stem, each 5 or 6 cm. in length. Staminate spadices shorter and shorter stalked, three to five at each node. Ripened ovaries 5 or 6 mm. long, and nearly as broad. Leaves numerous and .5 to 2 meters long, 1 to 2 mm. wide, coriaceous, and oval in transection, dark olive-green. Sclerenchyma less abundant than in *P. Scouleri*. Abundant on the ocean shores mixed with *P. Scouleri*, but inclining more to tide-pools and protected coves among the rocks, often seeming to grow in tussocks or turfs in the sand, but really arising from sand-covered stones. Specimens examined from the Russian River, Cal. (Dudley), Farallones Ids., and Santa Barbara (Cal. Acad. Coll.), San Diego (Cleveland), Ensenada, Lower California (Brandegge), and many from Santa Cruz, Pacific Grove, and San Luis Obispo Bay, Cal. I have no doubt it extends to Vancouver and beyond, also much further south than it has yet been reported.

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## LOWER CALIFORNIA GRASSES.

AN ENUMERATION OF THE GRASSES COLLECTED BY MR. T. S. BRANDEGEE IN LOWER CALIFORNIA IN 1893.

BY F. LAMSON-SCRIBNER.

I have not had time nor the facilities, even if I had desired, to fall into line with the nomenclaturists of the day in this enumeration, but I have studied the plants of the collection carefully, and so far as I have ventured to name them I believe they will be understood. I have been unable to consult the collections of Bourgeau, Botteri, Liebmann, and some others, and it is very likely that I have erred in some of my determinations. I have, however, done the best that the facilities at my command would permit.

February 26, 1894.

1. *TRIPSACUM LANCEOLATUM* Rupr. in Benth. Pl. Hartw. 247; Fourn. Mex. Pl. Enum. Gram. 68.—El Taste, September 13 (4).
2. *HACKELOCHLOA GRANULARIS* (L.) OK. *Cenchrus Granularis* L.; *Manisuris granularis* Sw.—El Taste, September 11 (20). Saucito, October 15 (68).
3. *ANDROPOGON SACCHAROIDES* Sw. Sessile or fertile spikelets  $2\frac{1}{2}$  lines long, awns 10-12 lines. I have exactly the same form from San Diego, collected by C. R. Orcutt.—El Taste, September 9 (47).
4. *ANDROPOGON CONTORTUS* L. *Heteropogon contortus* R. & S. El Taste, September 13 (2); Pescadero, September 23 (1).
5. *ANDROPOGON IMBERBIS* Hack. in *Flora* 1885, 119. A form with the pedicellate spikelet awned.—Saucito, October 15 (65).
6. *ANDROPOGON HIRTIFLORUS* HBK. var. *FEENSIS* Hack. *A. feensis* Fourn.—El Taste, September 13 (31).
7. *ÆGOPOGON GEMINIFLORUS* HBK. var. *UNISSETUS* Fourn. *Æ. unisetus* R. & S.—La Chuparosa, October 17 (60).
- 7a. ———. Var. *BREVIGLUMIS*, n. var. Spikelets two in each cluster, one hermaphrodite, the second reduced to a pair of aristiform empty glumes and a linear, triaristate floral glume. The empty glumes of the perfect floret very short and narrow so that the glumes appear to be awn-like from the base, subequal and about the length of the triaristate flowering glume. This is unlike any other form which I have, the nearest approach to it being No. 247 E. Palmer (1886). The details of the spikelets in this genus vary so much that I hesitate to give this plant specific rank.—Saucito, October 14 (69).
8. *NAZIA OCCIDENTALIS* (Nees). *Tragus occidentalis* Nees. *Lappago aliena* Griseb.—El Taste, September 11 (36).
9. *PASPALUM KARWINSKYI* Fourn.? Allied to *P. paniculatum* L. Nodes, sheaths, and leaves smooth, racemes 10-16,  $1\frac{1}{2}$  inches long, approximate; spikelets  $\frac{3}{4}$  lin. long quadriseriate, obtuse, smooth.—San José del Cabo, September 2 (15).
10. *ERIOCHLOA PUNCTATA* Hamilton. *Nelopus punctatus* Nees.—El Taste, September 15 (41).

11. *PANICUM SANGUINALE* L.—El Taste, September 9 (49); La Honda, October 22. Empty glumes densely pilose at the apex and along the margins (*P. fimbriatum* Kth.), (53).—San José del Cabo, September 2 (29).

12. *PANICUM* ———. Allied to *P. filiforme* L. Spikes 2–5, approximate, 2–3 inches long, outer glumes ciliate and fimbriate along the margins —El Taste, September 11 (42, 43).

13. *PANICUM PASPALOIDES* Pers.—El Taste, September 9 (13).

14. *PANICUM VELUTINOSUM* Nees. Agrost. Bras. 121, (*P. Petiverii* β. Trin. Icon. t. 180). Spikelets  $1\frac{1}{2}$ –2 lines long, obovate, abruptly acuminate pointed, dark purple and pubescent towards the apex; fourth glume minutely mucronate pointed and transversely rugose; leaves narrowed at the base, not cordate.—Saltillo, September 17 (17).

15. *PANICUM PETIVERII* Trin.? = No. 159 and No. 208 E. Palmer 1887 (*P. dissitiflorum* Vasey, ined.). Spikelets  $1\frac{1}{2}$  lines long. Outer glumes shortly and sparsely pubescent, the first 3-nerved and  $\frac{1}{3}$  as long as the spikelet, the second and third glumes 5-nerved and together with the fourth abruptly short-pointed. The fourth glume punctate striate on the back (not transversely rugose). Leaves cordate clasping at the base where they are sparingly ciliate on the margins. Racemes distant, 2 inches long, remotely flowered, spikelets solitary or in pairs on short, pilose pedicels.—Pescadero, September 23 (27).

16. *PANICUM AVENACEUM* HBK. Nov. Gen. et Sp. i. 99.—El Taste, September 12 (21).

17. *PANICUM DECOLORANS* HBK.? Spikelets turgid,  $1\frac{1}{2}$ –2 lines long. First glume hardly  $\frac{1}{2}$  as long as the spikelet, obtuse 5-nerved, the second and third glumes longer than the fourth, broadly lanceolate, subacuminate, 7–9 nerved, the third with a palea, fourth glume obtuse. Habit of *P. decolorans* as described by Kunth.—Saucito, October 14 (70).

18. *PANICUM COMPACTUM* Sw., Griseb. Flor. Br. W. Ind. 552.—Saltillo, September 16 (22).

19. *PANICUM LATIFOLIUM* L. Sp. Pl. ed. i., *P. divaricatum*



HBK. and Am. auct.=No. 362 E. Palmer 1886.—El Taste, September 11 (23). San Felipe, September 9 (28).

20. *PANICUM BREVIFOLIUM* L.—El Taste, September 10 (24).

21. *PANICUM COLONUM* L.—San José del Cabo, September 1 (40).

22. *PANICUM COLONUM*—depauperate? Culms very slender 3-4 inches high; leaves narrow-linear; racemes reduced to 1-6 spikelets.—El Taste, September 11 (52).

23. *OPLISMENUS BURMANNI* (Retz) Beauv. *O Humboldtianus* Nees, not Presl.=No. 463 E. Palmer 1886.—Miraflores, October 13 (75).

24. *SETARIA GLAUCA* Beauv.—Saltillo, September 17 (32).

25. *SETARIA VIRIDIS* Beauv.? San José del Cabo, September 2 (46).

26. *SETARIA*———. Panicle branched interrupted below, caudate; bristles much exceeding the spikelets which are about 1 line long. First glume very small obtuse, 3-nerved; second glume 5-nerved, a little shorter than the flowering glume; third 7-nerved as long as the acute and transversely rugose flowering glume.=No. 191 E. Palmer 1887, also No. 957 E. Palmer 1878.—San Felipe, September 9 (45). To be compared with *S. unisetas* Fourn.

27. *SETARIA SETOSA* Beauv.? Spikelets  $1\frac{1}{4}$  lines long, first glume acute, 3-nerved,  $\frac{1}{2}$  as long as the spikelet, second glume  $\frac{1}{2}$  shorter than the fourth 7-nerved; flowering glume transversely rugose and mucronate pointed.—Pescadero, September 20 (48).

28. *CENCHRUS ECHINATUS* L.—Mazatlan, Mexico, October 8 (79).

29. *CENCHRUS PALMERI* Vasey! Proc. Calif. Acad. Sci. Ser. 2, vol. ii. p. 211; grasses of the Pac. Slope t. 3.=No. 689 E. Palmer 1887, collected at Los Angeles Bay, Southern Calif. This is possibly *Cenchrus pauciflorus* Benth. Bot. Sulph. 56. Bentham's plant which was from the Bay of Magdalena is thus characterized: "Culmis suberecto, foliis glabris vix scabriusculis, involucris alternis, distantibus, pilosiusculis sub 10-fidis, spiculis subternas superantibus."—La Mesa, October 24 (12).

30. *ARISTIDA BROMOIDES* HBK. Empty glumes unequal, the first 2-3 lines long, acute, the second  $3\frac{1}{2}$ -4 lines, acute or obtuse, both 1-nerved. Floret about the length of the second glume. Awns subequal,  $2\frac{1}{2}$ -5 lines long, lateral awns slightly divergent. Callus densely barbate. Culms slender, branched, 6-12 inches high, with a narrow strict panicle 2-5 inches long.—Saucito, October 15 (66).

31. *ARISTIDA SCHIEDEANA* Trin. First empty glume lanceolate, acute,  $3\frac{1}{2}$ - $4\frac{1}{2}$  lines long, strongly aculeolate scabrous on the keel for the entire length; second glume a little longer than the first, 1-nerved, obtuse or shortly bifid at apex, the smooth midnerve projecting as a short mucro between the lobes; flowering glume with a slender and acute barbate callus nearly  $\frac{1}{2}$  line long, the glume 6-7 lines long, with an awn 2 lines long, the lateral awns minute. Panicle 6-10 inches long, branches 2-4 inches, solitary or in pairs, rather rigid, widely spreading, with appressed spikelets above the middle, naked below. Culms 1-2 feet high, rather slender.—Saucito, October 15 (64).

32. *ARISTIDA CALIFORNICA* Thurber.—San José del Cabo., September 12 (38).

32a. *ARISTIDA SCABRA* Kunth, *Streptachne scabra* HBK. *Ortachne scabra* Fourn.—El Taste, September 11 (26).

33. *ORYZOPSIS FIMBRIATA* Hemsl. *Stipa fimbriata* HBK. Empty glumes about  $2\frac{1}{2}$  lines long, equaling or slightly exceeding the obovate obtuse and pilose flowering glume, shortly mucronate pointed. Awn of the flowering glume about  $7\frac{1}{2}$  lines long, once or twice geniculate, strongly twisted below, scabrous. Callus very short, acute, barbate. First glume 5-nerved, the second 3-nerved. Radical leaves involute filiform, about a foot long, shorter than the culm.—La Chuparosa, October 17 (72).

34. *MUHLENBERGIA LAXIFLORA* Scribn.=No. 1412 C. G. Pringle (1887). Empty glumes about  $\frac{1}{2}$  line long, subequal, obtuse; flowering glume 2 lines long narrow-lanceolate, 3-nerved, 2-toothed at the obtuse apex awned; awn 1-2 lines long. Callus barbate. Culms 2-3 feet high, simple, panicle narrow, elongated, dark purple. Perennial from a stout root-stock.—La Chuparosa, October 17 (74).

35. MUHLENBERGIA DISTICHOPHYLLA Kth.—El Taste, September 13 (33, 34).

36. MUHLENBERGIA CILIATA Kth.=No. 1435 Pringle (1887) La Chuparosa, October 21 (59).

37. MUHLENBERGIA ———. Near *M. stipoides*. Annual culms caespitose, branched, slender, with usually 7 nodes; leaves flat, spreading, 2–3 inches long,  $\frac{1}{2}$  line wide, sheaths shorter than the internodes. Panicle 4–5 inches long strict, base enclosed within the uppermost sheath. Spikelets 2 lines long with a slender awn 6–8 lines long; empty glumes short (about  $\frac{1}{2}$  line) subequal obtuse; flowering glume scabrous on the back, pilose on the margins below, apex minutely 2-toothed, awn from between the teeth; callus short, minutely harbate.—La Chuparosa, October 17 (71).

38. MUHLENBERGIA ———. Culms taller and more branched than in the last (No. 71) and awns longer, 8–18 lines, otherwise the same.—Saucito, October 15 (62).

39. LYCURUS PHALAROIDES HBK.—Sierra de la Laguna, October 19 (77, 81).

40. PEREILEMA CRINITUM Presl.—La Chuparosa, October 18 (63).

41. SPOROBOLUS MINUTIFLORUS Link.? Scribner in Proc. Acad Nat. Sci. Phila. (1891) p. 299.=No. 3130 Pringle (1890) —La Chuparosa, October 17 (80).

42. SPOROBOLUS RACEMOSUS Vasey.=No. 4B, E. Palmer 1885 (in herb. mihi) and 1425 Pringle 1887.—La Chuparosa October 21 (58). Mixed with this are specimens of *Sporobolus annuus* Vasey and *Muhlenbergia ciliata*.

43. SPOROBOLUS DOMINGENSIS Kth.=No. 165 E. Palmer 1887.—San José del Cabo, September 2 (7).

44. SPOROBOLUS VIRGINICUS Kth.=No. 338 E. Palmer 1887.—Guaymas, Mexico (7).

45. SPOROBOLUS EXPANSUS Scribn. Culm stout 4–6 feet high; sheaths smooth, striate; ligule a short and densely ciliate line; lamina narrow, elongated filiform, smooth on the back, pilose above near the base and serrulate-scabrous along the margins;

panicle 1-2 feet long caudate, branches slender, erect, spreading. the lower 6 inches long, rather densely flowered; spikelets subracemose along the branches, nearly 1 line long; empty glumes unequal, the first about  $\frac{1}{2}$  the length of the second which nearly equals the flowering glume; flowering glume smooth barely acute, awnless, callus naked.

This grass is closely allied to *Sporobolus Wrightii* Scribn. (in Torr. Bull. ix, 103) but is apparently even more robust, panicle more elongated, branches and pedicels more slender and *scabrous* and spikelets smaller. It is possibly *Epicampes expansa* Fourn. but it certainly is as good a *Sporobolus* as *S. Wrightii*. Fournier enumerates twelve Mexican species of *Epicampes* but his descriptions are so short or incomplete that it is very difficult to make positive determinations.—Pescadero, September 23 (16).

46. DESCHAMPSIA PRINGLEI Scribn. Proc. Acad. Phila. (1891) p. 300=No. 1429 Pringle 1887.—La Chuparosa, (55).

47. MICROCHLOA SETACEA R. Br.—El Taste, September 11 (5).

48. CHLORIS ELEGANS HBK.—San José del Cabo, September 2 (6).

49. LEPTOCHLOA MUCRONATA, Kunth.—San José del Cabo, September 2 (18).

50. LEPTOCHLOA VIRGATA Beauv. var. MUTICA Fourn. Pl. Mex. Enum. Gram. 146. *Diplachne verticillata* Nees & Mey. *Diplachne imbricata*, Thurb.=No. 47, E. Palmer (1887) and No. 331 (1886).—San José Del Cabo, September 2 (8).

51. BOUTELOUA ARISTIDOIDES, Thurb. *Dinebra aristidoides* HBK.—Pescadero, September 23 (51).

52. BOUTELOUA CURTIPENDULA Gray. *Chloris curtispindula* Michx. *Bouteloua racemosa* Lag.—El Taste September 11 (3).

53. BOUTELOUA AMERICANA Scribn. Proc. Acad. Nat. Sci. Phila. (1891) 306. *Bouteloua bromoides* Lag. *Bouteloua Humboldtiana* Griseb.—La Honda October 21 (59). The details of the spikelets in this specimen agree with the figure of *Dinebra bromoides* HBK. Nov. Gen. t. 51.—El Taste, September 11 (25). In this the characters of the spikelets are those of *Dinebra*

*repens* HBK. as figured in Nov. Gen. Pl. t. 52. These species (*Dinebra bromoides*, *D. repens* and *Bouteloua Humboldtiana*) were united under *Bouteloua bromoides* Lag. by S. Watson in Proc. Amer. Acad. 1883, p. 177. *Aristida Americana* Sw., Obs. 41, t. ii, f. 2 (1791), cited by Kunth, is an older synonym, the specific name of which is taken up.

54. *BOUTELOUA HIRSUTA* Lag.—El Taste, September 12 (19).

55. *BOUTELOUA POLYSTACHYA* Torr.—San José del Cabo, September 2 (39).

56. *PAPPOPHORUM MUCRONULATUM* Nees. ?=No. 350 E. Palmer (1887). This may be only a form of *P. alopecuroides* Vahl., but it differs from my West Indian specimens so ticketed, and it does agree very well with Doell's figure and description of *P. mucronulatum*. It is not *P. apertum* Munro, Scribn. in Bull. Torr. Club, ix (1882) p. 52. The following are some of the characters of the spikelets: Spikelets including the awns 11–12 mm. long, with usually two perfect flowers and two to three empty glumes above. Lower empty glumes ovate lanceolate, bristle-awned between the two unequal teeth at the apex, the second about 5 mm. long, a little exceeding the first. Flowering glumes broad and rounded on the back, about 3 mm. long to base of awns, densely pilose on the short and obtuse callus and on the midnerve below the middle and on the sides half way up, pubescent on the inner face above, 7-nerved. Awns 12–15, the longer ones 8–9 mm. diverging, violet-colored, strongly scabrous. The upper empty glumes with a villous tuft on the back below the middle, sides and callus naked.—Guaymas Mexico, November 7 (76).

57. *MONANTHOCHLOA LITTORALIS* Engelm.—Pescadero, September 23. (Mixed with No. 35).

58. *ERAGROSTIS PLUMOSA* Link. *Poa tenella*. Kunth. Revis. Gram. ii. 467, t. 147, not Linn. *Eragrostis ciliaris* var. *patens* Chapm.—San José del Cabo, September 2 (9).

59. *Eragrostis major* Host.—El Taste, September 11 (37).

60. *Eragrostis lugens* Nees.—La Chuparosa, October 17 (78).

61. *ERAGROSTIS NEO-MEXICANA* Vasey. I have this from

New Mexico, collected by G. R. Vasey 1881.—El Taste, September 9 (14).

62. ERAGROSTIS ———. El Taste, September 9 (50).

63. ERAGROSTIS LIMBATA Fourn.? = 234 E. Palmer 1886.—Saucito, October 15 (67).

64. ERAGROSTIS NIGRICANS Steud. (*Poa nigricans* HBK.). This is apparently a small form of this species.—Sierra de la Laguna, October 19 (82).

65. DISTICHLIS SPICATA (L.).—Pescadero, September 23 (35).

66. FESTUCA TENELLA Willd.? This appears to me to be only a very delicate form of *Festuca tenella* Willd. Very likely it is the *Festuca muralis* Kth. var. *pumila* Fourn. Mex. Pl. Enum., Gram. 123, without description, reference being made to No. 554 Liebmann, collected at Cerro Leon.—La Chuparosa, October 17 (61).

67. BROMUS ———. Allied to *B. Kalmii*. The species of Bromus are exceeding variable, and their determination difficult. I have nothing which matches this, but doubtless it has been published. The slender culms are about 2 feet high, and minutely pubescent; sheaths downwardly pubescent; panicle small, the axis and branches pubescent. Empty glumes unequal, the first lanceolate, acute, 1-nerved, the second oblong, obtuse, and 3-nerved; flowering glume finely pubescent all over, obtusely bifid and short awned between the teeth.—La Chuparosa, October 17 (73).

68. BRACHYPODIUM MEXICANUM Link.—La Chuparosa, October 16 (54).

69. JOUVEA STRAMINEA Fourn.? Scribner in Bull. Torr. Bot. Club, xvii, p. 226; *Rachidospermum Mexicanum* Vasey, Bot. Gaz. xv, 110.—San José del Cabo, October 27 (10).

# SYSTEMATIC BOTANY OF NORTH AMERICA.

UNDER THE EDITORSHIP OF

N. L. BRITTON, Columbia College, New York City.	JOHN M. COULTER, Lake Forest University, Lake Forest, Ill.	F. V. COVILLE, U. S. Dept. of Agriculture, Washington, D. C.
EDWARD L. GREENE, University of California, Berkeley, Calif.	BYRON D. HALSTED, Rutger's College, New Brunswick, N. J.	ARTHUR HOLLICK, Columbia College, New York City.
LUCIEN M. UNDERWOOD, De Pauw University, Greencastle, Ind.		

COLUMBIA COLLEGE, NEW YORK, November —, 1893.

MY DEAR SIR:—

It is proposed to publish a comprehensive, descriptive Flora of the United States and British America in the general sequence of the larger groups adopted in "Die Natürliche Pflanzenfamilien" of Engler and Prantl, thus including all the known plants of this area. In order to accomplish this, the widest co-operation of American Botanists is desired, and I am authorized by the Board of Editors to invite your interest and assistance.

The work will be issued in parts averaging about 100 pages each in royal octavo or small quarto size. About 5 of these parts will constitute a volume, and it is estimated that about 75 parts, making 15 volumes, will be required. No illustration is contemplated, but copious references to published plates and figures will be made a feature. In addition to the technical characterizations, chapters dealing with the economic, palæontologic and horticultural aspects of each order will be appended. Especial attention will be given to the verification of original descriptions, to the examination of type specimens, to the citation of type localities, and to geographical distribution.

No attempt will be made to treat the groups consecutively, but the sequence of orders being tentatively established in advance, and the number of genera and species being approximately known, it is possible to print parts of all the volumes, or of as many of them as is desired at about the same time. It is hoped that five or six parts can be issued annually, beginning in 1896. Several parts are already in preparation.

The following botanists have consented to co-operate with the editors in preparing monographs of various groups, or in superintending their preparation:

Prof. Thos. C. Porter, Lafayette College, Easton, Penn.; Prof. Chas. E. Bessey, University of Nebraska, Lincoln, Neb.; Prof. Chas. R. Barnes, University of Wisconsin, Madison, Wis.; Prof. Wm. Trelease, Missouri Botanic Garden, St. Louis, Mo.; Prof. Conway Mac Millan, University of Minnesota, Minneapolis, Minn.; Prof. J. A. Arthur, Purdue University, Lafayette, Ind.; Dr. Thomas Morong, Columbia College, New York City;

February 26, 1894.

Prof. L. H. Bailey, Cornell University, Ithaca, New York; Prof. Lester F. Ward, U. S. National Museum, Washington, D. C.; Mr. O. F. Cook, Huntington, New York; Dr. William Wheelock, Columbia College, New York City.

Each monographer will be responsible for his own matter, the only restrictions placed on contributors being that they conform to a general style and to principles of nomenclature and citation, and that descriptions be extended only to an average limit of a certain number of words, this number to be hereafter determined. The treatment of these matters will be indicated by sample sheets, which will be submitted at an early date. It is expected that an approximately uniform consideration of species can be secured.

The editors believe that by prosecuting the work in the manner above indicated, it will be possible to produce a complete Systematic Botany of the country within fifteen years. They fully realize the impracticability of such a task being accomplished by a few students only, and earnestly desire the aid and support of all American Botanists. They request your co-operation, and ask that you send a reply to this letter to the undersigned, and will welcome any suggestions that you may be pleased to make.

For the Board of Editors,

N. L. BRITTON,

Chairman.

The above circular was sent to a number of Botanists besides those mentioned in the text. While a "Flora of the United States and British Columbia" is highly desirable, a glance at the names of the proposed monographers gives evidence that if ever accomplished it will be a remarkably uneven work. The qualification for participants seems to be not capacity and attainments, but solely agreement with the peculiar nomenclatural predilections of the editors. As they, or some of them, are, however, already at loggerheads over details, the date of the completion of the work is likely to be still farther in the future than the estimated "fifteen years."

K. B.

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## A NEW SPECIES OF BULIMULUS.

BY HENRY HEMPHILL.

*EULIMELLA OCCIDENTALIS.* Shell small, turriculated, white, shining, transparent, consisting of about nine rather flattish convex whorls, with a single fine, revolving, threadlike liræ

March 12, 1894.



above the periphery, and with very fine microscopic revolving striæ beneath, observable only with a good glass and light; suture deep; aperture subquadrate; lip simple, acute; columella straight.

Length—4 mill.

Breadth—1 mill.

Habitat, San Diego, California.

Station, mudflats between tides.

I collected about twenty specimens of this interesting little shell some years ago, which seems undescribed, and I take this occasion to add it to our West Coast shells.

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### CHARIESSA LEMBERTI.

BY J. J. RIVERS.

CHARIESSA LEMBERTI nov. sp. Form robust, prothorax widest across the middle; head and prothorax finely punctate; Elytra twice as long as wide, but widening from base to near the apex; finely punctured in a faintly longitudinal pattern and covered with very short black hair. Color: Head, basal joints of antennæ, prothorax, legs, all but the tarsi, and the whole of the underparts red of a subdued crimson. Size: Variable in both sexes from 8–12 mm.

Has a superficial resemblance to *C. elegans* Horn, but is distinguished by having its thorax flatter and wider, by the legs being red instead of black (except the tarsi), by the basal joint of antennæ being red, and by its prothorax not bearing a polished surface, as in *C. elegans* Horn, and the insect is altogether a wider species. Habitat: Yosemite. Collected by Mr. J. B. Lambert, who kindly presented it to me.

March 12, 1894.

## TWO UNDESCRIBED PLANTS FROM THE COAST RANGE.

BY T. S. BRANDEGEE.

**EASTWOODIA** nov. gen. (pl. xxx.\*) Heads homogamous, discoid, many-flowered, all the flowers fertile. Involucre short-campanulate, bracts narrow, few-seriate. Receptacle hemisphaerical, papillate by the elevated points of attachment of the flowers and their embracing paleæ. Corolla yellow, tubular-funnelform, shortly five-cleft. Stamens exserted, obtuse or emarginate at base. Style-branches flattened, stigmatic lines marginal, not extending to the tip. Akenes turbinate, obscurely angled, crowned by 5-8 paleæ.

Named in honor of Miss Alice Eastwood, curator of the herbarium of the California Academy of Sciences.

**E. ELEGANS.** Suffrutescent, nearly glabrous perennial  $\frac{1}{2}$ -1 m. high, branching; stems striate, bark whitish, shreddy in age: leaves alternate, sessile, fascicled in the lower axils, linear-oblan-ceolate, acuminate, 1-nerved, minutely and very sparsely scabrous, somewhat succulent, 2-4 cm. long, 2-4 mm. wide: heads  $1\frac{1}{2}$ -2 cm. broad,  $1-\frac{1}{2}$  high, solitary or loosely cymose at the upper part of slender bracts, leafy shoots of the year,  $2-2\frac{1}{2}$  dm. long: involucre appressed; bracts corneous, whitish, 3-4-seriate, oblong-lanceolate, mucronate, the inner broader and with a scarious erose margin; bracts of the receptacle complicate, oblong, corneous, with scarious erose tip, caducous, densely glandular below the tip within as are also those of the involucre: corolla glabrous, 6 mm. long, somewhat leathery: stamens and style well exserted; style branches broad, rounded at summit, not appendaged, glabrous within nearly to the tip, hirsute on the upper half without, stigmatic lines narrow; akenes short-turbinate somewhat 3-4-angled, densely upwardly pubescent, about 2 mm. long, not contracted at the summit; pappus of 5-8 unequal, white, linear-lanceolate erose-margined, corneous, persistent paleæ, much longer than the akenes. Collected by Mr. L. Jared on the Cariso Plains; by Miss Eastwood, near Alcalde; by Mr. W. L.

\* EXPLANATION OF PLATE. E. flowering branch; C. flower showing exserted stamens and style; D. bract of receptacle; B. stamens; style tips greatly magnified.

March 12, 1894.

Watts on the hills west of Bakersfield, and by the writer near the same time and in the same general region, April-June, 1893.

The affinities of this plant are with *Asteroideæ*, of which it has the style-tips and involucre with much the general habit of the desert species of *Aplopappus*, but it differs from any of the genera in its complicate-chaffy receptacle, and its pappus. The western rim of the San Joaquin Valley yet little explored may be expected to still yield many novelties.

*LEPIDIUM JAREDII*. Annual, branching, 1-2 dm. high, somewhat glaucous, upper part of stem and inflorescence pubescent, with spreading hairs: leaves lanceolate, entire, or toothed: flowering branches becoming elongated, often half the length of the plant: pedicels terete, slender, spreading, in fruit, 1 cm. long, and somewhat recurved; flowers bright yellow: sepals 2 mm. long: petals a third longer, with oval or obovate blade and narrow claw: stamens 6, nearly equal: fruit ovate, glabrous, reticulate, 3-4 mm. wide and hardly as long, acute or barely emarginate, at summit, not winged; style  $\frac{1}{2}$  mm. long; cotyledons incumbent.

Collected by Mr. L. Jared near Goodwin, San Luis Obispo County, April-May, 1893; and near Riverdale, Fresno County, about the same time by Mr. Alvah Eaton.

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## ADDITIONS TO THE FLORA OF THE CAPE REGION OF BAJA CALIFORNIA. II.

BY T. S. BRANDEGEE.

The following collection was made during the months of September and October in the western part of the mountains of the Cape Region.

The particular localities explored were either previously unexplored or had been visited at a different time of the year. The rainy season of the region is in the months of July, August, and September, but little rain fell about San José del Cabo, and consequently there were comparatively small collections made in its vicinity; and the same conditions prevailed over the region

March 12, 1894.

between the high mountains and the Gulf of California, but west of the mountains the ground was well soaked by frequent showers, and vegetation was luxuriant.

The numbers of the list are continuous with those of previous ones. All above 739 are additions to the known plants of the Cape Region. The smaller numbers belong to plants which occur in the previous lists, of which better specimens or fuller material require notice, or lead to rectifications of diagnosis.

The grasses of the collection have been studied by Prof. F. Lamson-Scribner, and are not incorporated here, and there yet remain a considerable number of species, requiring careful study, which for lack of time could not be made ready for this paper.

2. *THALICTRUM VESICULOSUM* Lec. var. *PENINSULARE*. Plants about 1 m. high, glabrous throughout, excepting a minute glandular pubescence on the margins of the sheaths, somewhat glaucous; stems striate: leaves tripinnate, distant; leaflets slender-petiolulate, thin, sometimes 3 cm., but ordinarily less than 2 cm. long, green above, glaucous below, spatulate, ovate or obovate, 3-6, commonly, 3-lobed at apex, the lobes entire: panicle loose and spreading somewhat leafy; pedicels elongated, filiform: flowers usually hermaphrodite: sepals 4, 2 mm. long, oblong-elliptic or oval, purplish, with conspicuous parallel veins: filaments filiform, flexuous, more or less dilated towards the top, in full development exceeding the linear 4-5 mm. long, mucronate anthers, ovaries about 5, stipitate; style filiform 6-8 mm. long, strongly papillose on the back, tapering to the extremity, stigmatic nearly the whole length, the thin margin rolled in: heads nodding in fruit, akenes 5-6 mm. long, usually concave on the inner angle, stipitate, tipped by more or less of the base of the style, the flattened sides and back strongly veined and nodulose.—Common at middle elevations in the mountains of the Cape Region.

This plant is geographically so far removed from the South American type that comparison of specimens may show them to be specifically distinct.

3. *RANUNCULUS ABORTIVUS* L. var. *AUSTRALIS*. Lower leaves reniform, 3-5 cm. broad, 2-3 cm. long, petals 5-6 mm. long. Perennial, flowering in August. Abundant in wet places

on the high summits of Sierra de la Laguna and San Francisco.

740. *RANUNCULUS HYDROCHAROIDES* Gray. Common in wet places and standing water, at La Chuparosa and Sierra de la Laguna, the immersed plants not in flower in October, those growing in wet banks just coming into bloom.

10. *LEPIDIUM INTERMEDIUM* Gray. Mature specimens now collected show that the cotyledons are incumbent, and this name should take the place of *L. Virginicum*. Some of the specimens have rather conspicuous petals like the New Mexico and Texas plants.

741. *CLEOME MELANOCARPA* Watson. The specimens differ from Dr. Palmer's Chihuahua plant in having slightly narrower pods. The petals are white, but the plant does not belong to the § *Physostemon*. It is common in September on the Pacific slope of the mountains.

742. *IONIDIUM PARIETARIÆFOLIUM* DC. (?) The same plant as Dr. Palmer's No. 93, 1885, from Chihuahua, Proc. Am. Acad. xxi, 415.—Common in the elevated region west of Sierra San Lazaro.

743. *ALSODEIA PARVIFOLIA* Wats (?)—Mountains east of Pescadero, September 16, 1893.

744. *POLYGALA GLOCHIDIATA* HBK. Cañon Hondo. Seen in but one locality.

36. *PARONYCHIA MONANDRA* Brandg. This grows abundantly about the Sierra de la Laguna. It seems to be the same as *P. Mexicana* Hemsley, excepting that the flower has one stamen instead of five, and probably it should be considered a variety of that species.

43. *TALINUM PATENS* Willd. The mark of interrogation should be omitted after this species. It is very common from near the seashore to middle elevations of the mountains.

745. *MALVASTRUM SCABRUM* Gray. One plant only was found in Cañon San Bernardo.

746. *KOSTELETZKYA CORDATA* Presl. Agrees well with the description in Reliq. Hænk. The flowers are pale lilac in

color, with yellow centres; the petals reflexed.—Abundant at Santa Anita.

747. *ANODA ARIZONICA* Gray. Sierra San Lazaro and at Cañon Hondo. Plants much larger than those described by Dr. Gray. Collected first by Lemmon in Arizona.

748. *OXALIS LATIFOLIA* HBK. Common on the west side of the mountains.

749. *ILEX* sp.

750. *ILEX* sp.

751. *COLUBRINA ARBOREA*. High-branching small tree 6-10 m. high, 10-15 cm. thick, sparingly pubescent on the young parts, becoming glabrous: branches slender, green: leaves alternate 3-nerved, thin, ovate-acuminate, 6-15 cm. long, the nerves ending in a series of arches, running close to and parallel with the margin of the leaf, each arch ending in an impressed gland on the lower surface of the remote rounded teeth; petioles 2-2½ cm. long; stipules slender caducous: flowers greenish in axillary cymes shorter than the petioles: calyx and pedicels sparingly pubescent: petals almost without claws rolled round the filament which exceeds them: ovary not free from the disk: fruit not seen. Mountains of the Cape Region, September-October, 1893.

This may possibly be a form of "*Rhamnus glomeratus*" Benth. Pl. Hartw. 9, which is evidently a *Colubrina* with hardly more than a generic description.

752. *VICIA EXIGUA* Nutt. Sierra de la Laguna.

162. *PHASEOLUS ACUTIFOLIUS* Gray, var. *TENUIFOLIUS* Gray. *P. montanus* Brandg.

753. *RHYNCHOSIA PHASEOLOIDES* DC. Sierra de la Laguna.

754. *CASSIA BIFLORA* L.—Rather common on the western side.

755. *CARICA CAUDATA*. Stems herbaceous, ½-1 m. long from a tuberous root: leaves thin, triangular to ovate in outline, 3-nerved, entire or 3-5-lobed acute or acuminate, truncate or cuneate at base, 3-12 cm. long on slender petioles often exceeding the blade: 3 flowers (only one cluster seen): peduncle 11 cm.

long, about 5-flowered; calyx  $1\frac{1}{2}$  mm. long, segments lanceolate, acute: tube of the corolla slender, 10 mm. long; lobes oblong obtuse half the length of the tube: stamens 10, the 5 larger 3 mm. long, 2-celled, nearly sessile, the alternates 1-celled, 2 mm. long on filaments little shorter—the connective in both forms brush-hairy at tip: rudiment of ovary 3 mm. long: ♀ flowers not seen: fruit 1-celled, oblong-oval beaked, 5-11 cm. long on slender peduncles half as long, and with five horns 3-5 cm. long projecting backward from the base: seeds 6 mm. long covered by the milky white aril; testa rugose, crustaceous. — The first specimen was collected by Dr. Gustav Eisen. It was afterward found abundantly, in fruit, about the western side of the mountains.

756. *ECHINO CYSTIS* (*ECHINOPEPON*) *COULTERI* (Gray).—Cañon Hondo.

259. *GARRYA WRIGHTII* Torr. This species is common in the mountains, and reaches a height of 3 m. or more. The leaves are not mucronulate on the margins as are most of the Arizona forms. Specimens from the Santa Rita Mountains have nearly smooth leaf margins, while those from Santa Pedro Martir are exceedingly rough.

757. *RANDIA OBCORDATA* Wats.—Common at low elevations.

758. *CRUSEA PARVIFOLIA* Hook. & Arn. Bot. Beech. 430. Agrees very closely with the description and figure, differing only in unessential particulars.—Cañon Hondo on the western side of the mountains.

274. *VALERIANA SORBIFOLIA* HBK.

759. *STEVIA MICRANTHA* Lag. In the mountains at various places, not common.

760. *EUPATORIUM SAGITTATUM* Gray. Common in the vicinity of Pescadero, usually growing in brush fences. Well-known from Guaymas northward to Arizona.

293. *ERIGERON SUBDECURRENS* Schultz Bip. This is the *Conyza Coulteri* of the previous list.

761. *CONYZA SOPHIÆFOLIA*, HBK.—El Taste.

762. *BACCHARIS SAROTHOIDES* Gray.—Near Sierra San Lazaro.

763. *GNAPHALIUM PURPUREUM* L.—Sierra de la Laguna.

764. *GNAPHALIUM GRACILE* HBK. Growing on the sandy dry beds of streams.

765. *FRANSERIA CAMPHORATA* Greene. Abundant in the vicinity of Pescadero. It extends northward to the foothills of San Pedro Martir.

*FAXONIA* gen. nov. Heads heterogamous, radiate, flowers of the ray ♀, of the disk ♂. Involucre of few, narrow bracts, sub-2-seriate and slightly unequal, some of the outer embracing the ray-flowers. Receptacle convex, paleæ, membranaceous, linear. Ligule of the ray-flowers rudimentary. Style glabrous, acuminate. Akenes somewhat curved, without pappus, apparently fertile. Flowers of the disk yellow, with deeply and somewhat irregularly cleft limb. Stamens distinct or two occasionally joined. Anthers short. Style branches linear, stigmatic on the inner surface nearly to the somewhat dilated truncate tip. Akenes with a pappus of irregular slender awns.

Named in honor of Mr. C. E. Faxon, whose exquisite drawings for the Sylva of North America have placed him in the front rank of botanical artists.

766. *F. PUSILLA*.\* Plant (only one seen) 8 cm. high, branching from near the base, villous all over with many-jointed hairs tipped with capitate glands: leaves opposite, lanceolate, unequal-sided, 1–2 cm. long, dentate, the teeth small, obtuse, and remote, the veins marked by oil glands; petiole very slender equaling, or in the upper many times exceeding the blade, dilated and somewhat clasping at base: inflorescence axillary; heads ovate 3–4 mm. high, 10–15 flowered: bracts of the involucre 6–8, nearly equal, lanceolate, with somewhat foliaceous tips, 2–4 of them curved, complicate and embracing the ray-akenes: receptacle not villous, bracts narrowly linear more or less united: ray-flowers with pubescent tube and nearly obsolete ligule; style branches long-acuminate; akenes apparently fertile, glabrous, curved, striate, compressed.  $1\frac{1}{2}$  mm. long: disk flowers 2 mm. long,

\* PLATE XXXI. 1, whole plant enlarged; 2, head; 3, ray-flower with embracing bract; 4, same with flower drawn out; 5, bract of the receptacle; 6, disk-flower; 7, same opened; 8, stamen.



tube densely glandular-villous, lobes linear, rather longer than the tube, pubescent, marked by oil-tubes, somewhat irregularly cleft and thickened at tip; anthers very short, oval, somewhat unequal at base, usually distinct, but sometimes 2 joined, less than  $\frac{1}{2}$  mm. long, including the equally long appendage; style-branches enlarged truncate and villous at tip.

767. *DYSODIA ANTHEMIDIFOLIA* Benth. The segments of the leaves are very broad and obtuse giving to the plant a very different appearance from the Magdalena Bay specimens.—Along the Coast below Pescadero.

*PECTIS BERLANDIERI* DC.—El Taste near Sierra San Lazaro. It is the same as Dr. Palmer's No. 61 (1885) from South-western Chihuahua, excepting that the leaves are much broader.

349. *HIERACIUM ARGUTUM* Nutt. (?) A high mountain plant which may possibly prove distinct.

768. *ERECHTHITES RUNCINATA* DC.—In damp fields at Santa Anita where it was probably introduced.

769. *BUMELIA ANGUSTIFOLIA* Nutt.—Small bushy trees growing in the vicinity of Pescadero. No mature fruit was found but the flowers, leaves, and habit are of this species.

770. *DIOSPYROS TEXANA* Scheele. "Guayparin." Probably a form of this species, but as no flowers could be found the determination is uncertain. It is a small tree and not uncommon along the base of the mountains. The leaves are two or three inches long and vary on different trees from glabrous to tomentose; the fruit about an inch in diameter is black when ripe and very pleasant to the taste.

771. *FORESTIERA MACROCARPA*. A shrub or small tree, 2-6 m. high, glabrous: leaves entire, of thin texture, elliptical or oblong-ovate, cuneate at base, acutish or obtuse, 2-3 cm. long, on peduncles 4-5 mm. long: drupes solitary or few in clusters, oblong, 12-15 mm. long, dark blue; pedicels about as long as petioles; putamen curved, striate.

This species is related to *F. pubescens* and *tomentosa* but differs from both by having thinner, glabrous leaves and larger fruit. The putamen is striate like that of *F. pubescens* and the leaves as entire as those of *F. tomentosa*.—Found in fruit only,

growing along a rocky stream near Sierra San Lazaro in the month of September.

772. *SARACHA JALTOMATA* Schlecht. (?) From its characters nearest to this species.—Near San Felipe, where it was probably introduced.

773. *STEMODIA PUSILLA* Benth. Plants less hairy, corolla larger and longer as compared with the calyx, than in Mazatlan specimens.—Cañon de San Bernardo.

774. *VERBENA PROSTRATA* R. Br. Spikes less dense and plants less hirsute than specimens from California. Seen only in San Bernardo Cañon, where it may have been introduced.

775. *VERBENA POLYSTACHYA* HBK. Sierra San Francisco, where it was doubtless introduced.

776. *DURANTA PLUMIERI* Jacq.—Both flowers examined had five stamens: one all perfect and the other with the fifth somewhat imperfect. Common at middle elevations on the west side of the mountains, sometimes forming impenetrable thickets.

462. *CITHAREXYLUM BERLANDIERI* Rob. Very nearly the same as Pringle's specimens from San Louis Potosi.—Found only about the cultivated fields of Miraflores where it is not uncommon.

777. *HYPTIS SUAVEOLENS* Poit.—Growing very abundantly about the ranch at La Mesa, where it was probably introduced.

778. *CELTIS PALLIDA* Torr.—Common about Pescadero and the western coast.

779. *CELTIS RETICULATA* Torr.—Small trees growing about Sierra San Lazaro.

517. *EUPHORBIA HETEROPHYLLA* L. A form of this variable species having the base of the floral leaves red is not uncommon in the mountains.

542. *EUPHORBIA INCERTA* Brandege. This species was collected on the sea shore at Mazatlan and as it is apparently a maritime species of considerable range should have been found by other collectors.

780. *BERNARDIA* (?) *FASCICULATA* Wats. Proc. Am. Acad. xviii, 153, 1883. It belongs however to the *Phyllanthææ*.

781. *CROTON MAGDALENÆ* Millspaugh.—San José del Cabo and in the mountains. Some forms are much less pubescent or hirsute than the type from Magdalena Island.

549. *CROTON FRAGILIS* HBK. Var.—This is very near the variety *sericeus* of Dr. Palmer's Chihuahua collection. The specimens from different parts of the Cape Region vary from one another very much in their pubescence, those from Sierra San Lazaro being much larger and more glabrous than those from the vicinity of San José del Cabo.

551. *BERNADIA MEXICANA* Müll. Arg. var. *B. viridis* Millsp. This is also the *B. Brandegei* Proc. Cal. Acad. ser. 2, vol. iii, 172, which is an inadvertence, no species having been described under that name. It is a rather common bush of the Cape Region at middle elevations.

536. *ADELIA VIRGATA*. A dioecious shrub 2-3 m. high with whitish stems and long almost simple branches studded with stout more or less woolly spurs on which are borne the crowded leaves and flowers: leaves oblanceolate to oblong or obcordate,  $1\frac{1}{2}$ -3 cm. long, sparingly appressed pubescent, soon glabrate, cuneate at base to a short petiole: flowers 4-6 at the summit of the spurs; pedicels 5-10 mm. long, jointed about the middle: calyx valvate, 5-parted, the segments acute, 2-3 mm. long densely villous without and within: stamens about 15 concreted at base with the rudimentary ovary. Ovary of ♀ flower sessile on the disk, 2-3-ordinarily 2-celled, hirsute; styles united at base, fimbriate-lacerate, stigmatiferous over the whole inner surface: fruit glabrate commonly 2-coccous, about 2 cm. high by 3 cm. in breadth, marked by a cruciform sulcus; seeds orbicular the size of a pea with coriaceous brown, somewhat mottled testa; endosperm thick; cotyledons reniform.—Widely spread over the southern part of the peninsula; now first collected in flower.

782. *SALIX TAXIFOLIA* HBK.—Growing along streams of the western side, but not abundant. Determined by M. S. Bebb.

783. *ARETHUSA ROSEA* Benth.—Common on the high mountains.

571. *MICROSTYLIS OPHIOGLOSSOIDES* Nutt.—High mountains of the Cape Region.

573. *HABENARIA CRASSICORNIS* Lindl. ex. char—High mountains of Cape Region, October, 1893.

574. *HABENARIA THURBERI* Gray.—High mountains, October 17, 1893.

784. *HABENARIA DIFFUSA* R. & G.—El Taste, September 14, 1893.

785. *HABENARIA CLYPEATA* Lindl.—El Taste, September 14, 1893.

786. *HABENARIA LUCÆCAPENSIS* Fernald.\*—Saltillo, September 16, 1893.

787. *TILLANDSIA RECURVATA* L.—Growing on bushes and trees, especially on arborescent *Cereus*, in a gap in the mountains southeast of Todos Santos.

578. *SISYRINCHIUM SCHAFFNERI* Wats.—The specimens vary considerably in height and breadth of leaves. Some of them agree perfectly with No. 1376 Pringle, from Chihuahua, as nearly as can be made out from comparison with an immature specimen.—Common on the summits of the mountains growing under oaks and pines.

588. *TRADESCANTIA CRASSIFOLIA* Cav.—This seems distinct from Pringle's No. 1681, but it agrees with the descriptions and Cavanilles' figure quite as well. The plants are smoother and smaller than the Mexican forms and nearest the variety *glabrata*.

590. *TINANTIA FUGAX* Schiedw. *T. modesta* Brandg. Proc. Calif. Acad. ser. 2, iii, 175. A rather common species, found along the base of the mountains in a branching almost glabrous form, at higher elevations in a more simple and pubescent form, the sepals long-glandular hairy.

788. *CYPERUS DIANDRUS* Torr.—La Mesa; San Jacinto.

789. *OPHIOGLOSSUM CROTALOPHOROIDES* Walter.† *O. bulbosum* Michx.—El Taste.

\* See page 379 preceding. The Orchidaceæ of this list were determined by M. L. Fernald of the Gray Herbarium.

† Filices determined by Prof. D. C. Eaton.

790. OPHIOGLOSSUM NUDICAULE L.—El Taste.  
791. GYMNOGRAMME PEDATA Kaulfuss.—Near Mt. San Lazaro.  
792. PELLÆA SKINNERI Hooker—Near Mt. San Lazaro.  
793. ASPLENIUM PUMILUM Swartz.—Near Mt. San Lazaro.  
794. WOODWARDIA RADICANS Smith.—La Chuparosa.  
795. MARSILIA MINUTA Fournier.—San José del Cabo. Identified by L. F. Underwood.
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## REVIEWS.

*Letters of Asa Gray—Edited by—Jane Loring Gray*—in two volumes—1893—Houghton, Mifflin & Co. "It has been my aim, in collecting and arranging the 'Letters' from Dr. Gray's large correspondence, to show as far as possible in his own words, his life and his occupation. The greater part of the immense mass of letters he wrote were necessarily purely scientific, uninteresting except to the person addressed; so that many of those published are merely fragments, and very few are given completely. I have made no attempt to estimate his scientific or critical labors, for they are sufficiently before the world in various printed works; but something of the personality of the man and his many interests may be learned from these familiar letters and from even the slight notes."

From this prefatory note by Mrs. Gray the scope of these letters is at once apparent. They make the reader acquainted with the man, and sufficiently so with the student of plants to make them indispensable to every American botanist. The botanical letters of Gray are still to be hoped for in the future. Nearly every contemporary botanist in America can furnish treasured and most interesting letters from him but it may be that they were intentionally withheld for the present, on account of his well-known habit of expressing his views forcibly and unreservedly concerning all botanical subjects discussed. We reprint, by kind permission of Mrs. Gray, on page 372 preceding, the last letter written by Dr. Gray.

*Die Parasitischen Exoasceen. A Monograph.* By R. SADEBECK. Hamburg, 1893. In the above monograph is presented a very complete and accurate account of the peculiar group of Fungi, the Exoasceæ. The members of this family are fungi of extremely simple structure, and some of them are parasites that cause serious trouble by their ravages. Probably the most familiar species is *Exoascus deformans* (Berk.) Fuckel, the cause of the well-known disease of peach trees popularly called "leaf-curl." When the trees are severely attacked they sometimes are almost completely stripped of their leaves, resulting in a serious check to the tree's growth.

The first section of Professor Sadebeck's monograph deals with a comparative study of the development and biology of the parasitic Exoasceæ. Although many experiments were made with various species, none of the attempts to grow the spores upon artificial culture media were entirely successful, and in no cases was he able to produce spore-bearing plants in this way. In some instances, however, he was able to follow the penetration of the host by the germ-hypha of the parasite, and to trace its development within the host. The species especially studied were *Exoascus Tosquinetii* (West) Sadeb., *E. epiphyllus* Sadeb., *Taphrina Sadebeckii* Johans., as well as several other species of *Taphrina*. In the species of *Exoascus* the mycelium is perennial, and this insures the perpetuation of the fungus, even if for any reason the spores should fail to germinate.

The asci open by a cleft at the apex, and the spores are violently ejected by the strong contraction of the side walls of the ascus which are in a state of tension before it opens. Sometimes instead of the ordinary spores, yeast-like conidia are produced within the ascus, and in case the conditions are unfavorable for the formation of either spores or conidia, e. g. in very rainy weather, the asci form directly yeast-like conidia by budding.

Sadebeck separates the parasitic Exoasceæ into the genera *Exoascus* Fuckel, *Taphrina* Fries, and *Magnusiella* Sadeb. The first genus is characterized by the perennial mycelium and the fact that the whole mycelium, or at least that part under the cuticle of the infected leaf, breaks up into cells that develop directly into asci. Twenty-one species are given.

*Taphrina* has no perennial mycelium, and therefore is entirely dependent upon spores for its propagation. The mycelium shows a differentiation into a sterile and fertile portion, the former alone giving rise to the asci. Fourteen species are included in the genus.

*Magnusiella* is a new genus that differs from both of the others in its more deep-seated mycelium and the formation of asci between the epidermal cells, and not below the cuticle. Five species are enumerated.

Two non-parasitic genera, *Endomyces* Tulasne, and *Ascocorticium* Brefeld, are also included in the Exoasceæ.

The remainder of the paper is mainly taken up with a critical discussion of the parasitic genera, with descriptions of all the described species, including their geographical distribution.

The paper is well illustrated by three excellent double lithographic plates.

DOUGLAS H. CAMPBELL.

*Maize: A Botanical and Economic Study.* (Contributions from the Botanical Laboratory of the University of Pennsylvania, Vol. i. No. 2.) By JOHN W. HARSHBERGER. This is a paper of much interest, on the structure origin, and economic importance of Indian corn.

*Minnesota Botanical Studies; Bull. 9. pt. i.:* I, Prefatory Note; II, The occurrence of sphagnum atolls in Central Minnesota, CONWAY MACMILLAN; III, Some extensions of plant ranges E. P. SHELDON; IV, On the nomenclature of some species of *Astragalus*, E. P. SHELDON; V, List of fresh water Algæ collected in Minnesota during 1893, JOSEPHINE E. TILDEN; VI, On the poisonous influence of *Cypripedium spectabile* and *Cypripedium pubescens*, D. T. MACDOUGAL.—Prof. MacMillan's paper is an attempt to account for the formation of Sphagnum atolls in lakes, with some account of the plants found on them. In No. 3 Mr. Sheldon gives a list of a number of plants either reported for the first time or rare in Minnesota, describing two new species, *Polygonum rigidulum* and *Aster longulus*; *Claytonia latifolia* an older varietal name is substituted for *C. Caroliniana*;

*Potentilla supina* var. *Nicolletii* is raised, and *Viola canina* var. *longipes* restored, to specific rank. In No. 4, the author shows that the Kew Index is not an unmixed blessing, by changing the names of a couple of dozen *Astragali*. Of these changes twenty-two are marked n. n., and two n. sp.; *A. scobinatulus* Sheldon taking the place of *A. Haydenianus* var. *major* which was changed because of *Astragalus glabriusculus* var. *major*, and *Astragalus elatiocarpus* Sheld. being substituted for *Astragalus lotiflorus* forma *brachypus*. *A. ceramicus* Sheld. is substituted for *A. pictus*; *A. ceramicus* var. *Jonesii* Sheld. for *A. pictus* var. *angustatus*; *A. ceramicus* var. *imperfectus* Sheld. for *A. pictus* var. *filifolius*; *A. accumbens* Sheld. for *A. procumbens* Wats.; *A. oblatus* Sheld. for *A. nudus* Wats.; *A. vexilliflexus* Sheld. for *A. pauciflorus* Hook.; *A. gilviflorus* Sheld. for *A. triphyllus* Pursh.; *A. gambellianus* Sheld. for *Astragalus nigrescens* Nutt. (crediting Prof. Greene by the way for "pointing out the difference between this species and *A. didymocarpus*"); *A. apilosus* Sheld. for *A. glaber* Michx.; *A. spatulatus* Sheld. for *A. cæspitosus* Gray; *A. syrticolus* Sheld. for *A. Thompsonæ* Wats. (changed on account of *A. Thomsonianus* Benth.); *A. Jepsoni* Sheld. for *A. demissus* Greene; *A. suturalis* Sheld. for *A. eriocarpus* Wats.; *A. intonsus* Sheld. for *A. villosus* Michx.; *A. umbraticus* Sheld. for *A. sylvaticus* Wats.; *A. famelicus* Sheld. for *A. fallax* Wats.; *A. asymmetricus* Sheld. for *A. lencophyllus* T. & G.; *A. Watsoni* Sheld. for *A. Hendersoni* Wats.; *A. prælongus* Sheld. for *A. procerus* Gray; *A. strigosus* (Kellogg) Sheld. (*A. hypoglottis* L. var. *strigosa* Kell.) for *A. tener* Gray, and in consequence of this change, *A. griseopubescent* Sheld. for *A. strigosus* Coult. & Fish.; *A. coccineus* (Parry) Brandegee, a synonym of *A. grandiflorus* Wats. is kept up on account of *A. grandiflorus* Pall. a synonym of *Oxytropis grandiflora*. Nearly all these names are changed on account of the "once a synonym always a synonym" rule, which is made to apply to synonyms of other genera and to varieties, not only as against younger species, but as against varieties of other species. Left to legitimate revisions it is not probable that a half dozen of these names would ever have to be changed, and in view of the vagueness of varieties in botany, and the fact that varietal names



are seldom catalogued a perfectly appalling vista of changes and uncertainty is opened to the view. It is matter of minor importance, but still to be regretted that Mr. Sheldon should have been so singularly unfortunate in the selection of some of his names.

The fifth paper is a list without notes, excepting of station, of fresh water Algæ. The sixth discusses the alleged poisonous properties of certain Cypripediums, the author concluding from his own experience that *C. spectabile* is in his case at least, a strong local irritant.

*Botany of the Death Valley Expedition* By F. V. COVILLE (Contr. U. S. Nat. Mus. vol. iv). This is one of the most important, as well as the most voluminous contributions to the botany of the Southwest. The chapters on "Characteristics and Adaptations of the Desert Flora" are most interesting, so also are those on distribution in which however must be taken into account the necessarily far from exact information acquired by a single expedition, which will be sufficient reason for differences of opinion not only as to many of the details of distribution, but as to the value of some of the zonal plants selected. The sixty-six pages devoted to a list of the species by numbers and to a bibliography might have been omitted as the information contained was nearly all embodied in the main list occupying the previous pages. The whole number of species and varieties enumerated including algæ and fungi is 1261 a considerable proportion of them belonging to the "Greeneian" category, and as the author remarks "It should be understood that the desert region of California of which Death Valley forms a part, does not contain all these twelve hundred species. More than one-half of them were collected either in the Sierra Nevada and its southern continuations, or in the Tulare Plains, areas with vegetation almost wholly different from that of the desert region." The paper would indeed have been of quite as much value if the long catalogue of familiar plants found along the route especially in the valley of the San Joaquin had formed no part. It adds very little more to our knowledge than would a similar list of the plants collected in an expedition from Boston to New York.

With the nomenclature of the author, as is perhaps well-known we do not agree, and especially we object to the setting aside of specific for older varietal names, as these last are seldom catalogued in works of reference the element of confusion introduced will be of very remote settlement.

We may safely rely upon Mr. Coville's future knowledge of Western plants, to convince him of the inherent weakness of the generic propositions of "*Oreobroma*," "*Uropappus*," "*Ptilocalais*," "*Linanthus*," "*Allocarya*," "*Sonnea*," "*Oreocarya*," "*Eremocarya*," "*Piptocalyx*," etc.

The metric system is adopted throughout the work as is now the custom in most scientific papers. — brought face to face with the kilometre we are however reminded with more than usual force of the great fault of the system—the inexcusably long terms. The author says: "To those not familiar with this system, the following table \* \* \* will be useful." We commend this table to the printers and proofreaders of the Department especially in connection with *Erigeron calvus* described both in Proc. of Biol. Soc. and in this work as "1 cm. high \* \* \* blades [of the leaf] 1-1.5 cm. long, tapering into a petiole of twice that length \* \* \* heads 7 to 8 mm. high." "*Potentilla purpurascens pinetorum* \* \* \* stems about 3 cm. high, radical leaves 7 to 14 cm. long." or *Phacelia hispida brachyantha* \* \* \* 1 to 3 cm. high \* \* \* calyx 5 mm. long \* \* \* in fruit reaching 10 mm. long."

The whole number of species and varieties described as new is 42. The author has described them with conscientious care and tolerable fullness. The greater number are valid as far as we can be certain from the text and the plates in which 21 of the species are figured. Very few of the types have been seen by us, but Mr. Coville promises a very welcome set to the Herbarium of the California Academy of Sciences, where it will be accessible to all botanists of the West.

*Aquilegia pubescens* seems too closely related to *A. chrysantha*.

Agreeing with Trelease Mr. Coville considers *T. platycarpum* as not more than a variety of *Fendleri*, he quotes in the synonymy Pitt. i, 166, but appears not to have noticed Mr.

Greene's remarks in Pitt. ii, 24 where he renames it *T. hesperium* under which name it occurs in his local floras.

*Brasenia purpurea* Michx. under *Hydropeltis*, 1803, is taken up in the place of *Brasenia pellata* Pursh, 1814: *Brasenia* was characterized by Schreber in Gen. Pl. ed. viii, 1789, and to the single species the name *Schreberi* was applied by Gmelin in Systema Naturæ, ed. iii, 853, 1791.

*Argemone platyceras* collected on the desert is of course the form of that species collected by the writer at one of the railway stations between Amboy and the Needles, and described by Mr. Greene as *A. corymbosa*.

*Cleomella brevipes* grows abundantly about Newberry Station, where it was collected in 1884.

*Isomeris arborea globosa* Cov. is in the herbarium of the California Academy of Sciences in every gradation between it and the typical form. Specimens collected by the writer between Caliente and Keene Station with very large globose pods have no groove in the seed. Specimens with long narrow pods from Calamajuet, Lower California have a deep groove. The same form from San Diego has no groove. All the forms grow together on the slopes of Tehachapi.

*Malvæopsis* is accepted by the author as the older name of *Malvastrum*. Mr. E. G. Baker, however, in the course of his enumeration of the Malvaceæ, says that the type of *Malvæopsis* was a *Sphæralcea*, wrongly identified by Otto Kuntze as a species of *Malvastrum*.

*Fremontia* is changed to "*Fremontodendron*" on account of the previous *Fremontia* a synonym of *Sarcobatus*.

*Purshia glandulosa* is kept up under *Kunzia*. In the opinion of the writer it is a not very distinct variety.

*Mentzelia reflexa* Coville was collected by the writer in the vicinity of Bagdad, on the Mojave Desert, in 1884.

*Aplopappus interior* Coville is evidently the form of *A. linearifolius* which prevails at a distance from the Coast. A good series of the forms approaching it would probably have modified the author's views.

*Aster mohavensis* Coville, "It cannot, however, retain its original specific name, since Michaux described an *Aster tortifolius* which is now referred to *Sericocarpus tortifolius*."

*Lessingia* "tennis" Cov. *L. ramulosa* var. *tenuis* Gray, of Bot. Cal. i. 307, and Syn. Fl. ii, 1, 162 "as to the pl. of Rothrock in Wheeler Rep. vi, 364. There is however an older var. *tenuis*, described in Proc. Am. Acad. vii, 351, belonging to *L. leptoclada* which in Syn. Fl. Supp. 447 is reduced with *L. nemaclada* Greene to *L. leptoclada* var. *microcephala* Gray. The printer has further complicated the matter by misprinting Mr. Coville's specific name, and altogether botanists adopting the Sheldonian method will have a good subject.

The specific name of *Pluchea borealis* is changed to *sericea* "(Nutt.) under *Polypappus*." The species was first published in Emory's Rep. 1848, p. 147 as "TESSARIA BOREALIS DC. An aromatic shrub about three feet high growing in all the deserted beds of the Gila, and in the Valley of the Del Norte usually with the *Frémontia* both of which are abundant in those regions." If this had been a plant of Rafinesque's it would have probably been considered quite well authenticated. It is certainly quite as recognizable, being placed in its proper genus, and with a definite locality, as Nuttall's later genus, sandwiched in between *Micropus* and *Psathyrotes*, and entirely without generic description, though named as a new genus, described from a single "imperfect specimen, apparently male," and with the station "Rocky Mountains of Upper California."

*Helianthus invenustus* Greene, was collected by Mr. Brandegee at Sequoia Mills 1892, and its peculiarities noted in Zoe, July 1893, p. 153.

*Layia* is maintained instead of the recently resurrected *Blepharipappus* under which Prof. Greene has renamed the species.

*Chanactis attenuata* can not be kept distinct from *C. carphoclinia*, every gradation is found between them.

*Lepidospartum striatum* Cov. is *L. latisquamum* Wats. Proc. Am. Acad. xxv. 133.—both described from the same plants collected by Shockley.

*Adelia* is taken up as an older name for *Forestiera*.

*Menodora spinescens* is in Shockley's collections from Candelaria.

Such species as *Navarretia setiloba* are evidence that the National Herbarium is in need of such a set of the variations

belonging to that section, as is possessed by the California Academy of Sciences.

*Phlox austromontana* Coville—"The No. 1839 Parish." which he includes in the type bears on the label "*Phlox speciosa* Pursh, var. *congesta* Gray (var. nov.), June, 1886.

In his remarks on *Macrocalyx micranthus*, Mr. Coville has evidently overlooked the notice in "Plants from Baja California," Proc. Cal. Acad. ser. 2, ii, 186.

*Conanthus aretioides* is reduced to *Nama* as *Marilaunidium aretioides*. If in obedience to Kuntze, *Nama* is applied to a different genus, one would think that *Conanthus* being reduced, it and not *Marilaunidium* should be the accepted name for *Nama*.

*Mohavea breviflora* can hardly be specifically distinct. Specimens of *M. viscida* with leaves as broad and nearly as short were sent by the writer to Gray in 1884.—They were collected at Amboy Station on the Mojave Desert. Mr. Brandegee collected the form described by Mr. Coville, at Keeler, in April, 1891—some of the corollas were conspicuously dotted while in others growing beside them the purple dots were nearly or quite wanting.

*Sarcobatus Baileyi* Coville, is founded on dwarfed and perhaps diseased specimens, for the large fruiting bracts contain not even the rudiment of an ovary. Our specimens of *S. vermicularis* do not sustain the remarks of the author, for the female flowers are as Bentham & Hooker say, axillary and solitary on leafy shoots of all lengths from 5 mm. to 1 dm. long—of course the longer the fruiting branch is the more flowers will be found upon it. There is certainly no such thing in any of our specimens as a "floral axis" of the female flowers, the fruiting branches are normally terminated by the male spike but it is often wanting, and the bushes seem even to be occasionally diœcious. If this stunted pubescent form deserved specific rank it would have *Sarcobatus Maximiliani* Nees, figured in Bot. Zeitung, vol. ii, 753, t. vii.

The new genus *Phyllogonum* can hardly be considered sufficiently distant from Nuttall's *Stenogonum*, in which though the single species is now referred to *Eriogonum*, the involucre is a very variable quantity, Nuttall said it had none. The embryo of *Phyllogonum* is described as "nearly straight, radicle lying along one angle of the seed; cotyledons orbicular, lying at the

base of the seed, bent at an angle of about  $45^{\circ}$  from the radicle." The artist has not been very successful in depicting a triangular ovary and akene.

*Bloomeria aurea* Kell, has its name changed to *B. crocea* on account of the *Allium croceum* Torr. Boh. Mex. Bound 218 (1859). But *Bloomeria aurea* was published in "The Hesperian" with a colored plate, December, 1859, and the month of the Boundary publication ought to be convincingly set forth before a name already well established in floriculture is disturbed.

*Ephedia viridis* named from imperfect material, occurs scattered through the range of *E. Nevadensis*, of which it is probably only a form. It is very bad practice, especially on the western side of the continent, to give currency to species no better characterized than this and *Potentilla eremica*. K. B.

*The Genus Phyllospadix*, by WILLIAM RUSSEL DUDLEY. Reprinted from the Wilder Quarter-Century Book. An interesting account of the genesis and structure of *Phyllospadix*. The author is evidently of opinion that the differences between the two forms are so slight as hardly to warrant their continued separation. The author has had better facilities than any previous student of the genus and the two excellent plates give one for the first time an adequate idea of the structural details of the plant.

*Manual of the Bay Region Botany, A Systematic Arrangement of the Higher Plants Growing Spontaneously in the Counties of Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco.* By EDWARD LEE GREENE. The title should have been *A Phanerogamic Flora of—counties in the State of California, omitting Typhaceæ, Lemnaceæ, Naiadaceæ, Alismaceæ, Juncaceæ, Cyperaceæ, Gramineæ, Coniferae and numerous species in the other orders; with thirty "new species" none of which are new, and nearly all vaguely characterized both as to character and station; and with every change of name which the author's present knowledge admits.* The work is a second and much restricted edition of the unfinished "Flora Franciscana," which under its misleading name included the

plants from Mt. Shasta to Tehachapi and the whole breadth of the State. The useful part of "Flora Franciscana"—the dates, citations and synonymy have been carefully omitted. The orders as presented by Mr. Greene furnish us some unfamiliar names such as Amarantoideæ, Tithymaloideæ, Sarmentosæ. From Rosaceæ he separates Pomaceæ and Drupaceæ; Cichoriaceæ from Compositæ considering it much nearer Lobeliaceæ; and Cuscutæ from Convolvulaceæ. In the matter of genera he has cut himself loose from all trammels crediting Dioscorides with 38 genera, Theophrastus with 14, Pliny with 32, Vergil, Varro, Dillenius and Micheli, each with 4, Brunfels with 12, Vaillant with 7, Dodoens with 8, Columna with 6, Lobel with 5, Galen, Tragus, Nicander, Gesner and Dalechamps each with 3, and 1 or 2 each to Catullus, Valerius Cordus, Cortusi, Ruppis, Chabræus, Mutis, Ruellius, Clusius, Camerarius, Matthioli, Cæsalpinus, Tabernaemontanus, etc., etc. The kaleidoscopic changes of generic names must keep his unfortunate pupils on the rack. *Clematis* again takes the place from which he ousted it in Fl. Fr. for *Clematitis*. The yellow-flowered watercress is to be called *Rorippa*; while the white-flowered species are retained under the old name. *Franca* takes the place of *Frankeniæ*; *Vibis* is substituted for *Emex*; *Hippocastanum* for *Æsculus*; *Siliculastrum* for *Cercis*; *Oxys* for *Oxalis*; *Butneria* for *Calycanthus*; *Pseudacacia* for *Robinia*; *Medica* for *Medicago*; *Opulaster* for *Neillia*; *Therofon* for *Boykinia*; *Limnopenice* for *Hippuris*; *Sphondylium* for *Heracleum*; *Distegia* for *Lonicera involucrata*; *Ecliptica* for *Eclipta*; *Gnaphalodes* for *Micropus*; *Heleniastrum* for *Helenium*; *Centrophylum* for *Carthamus*; *Triodanis* for *Specularia*; *Brossæa* for *Gaultheria*; *Meadia* for *Dodecatheon*; *Alsinanthemum* for *Trientalis*; *Pervinca* for *Vinca*; *Plantaginella* for *Limosella*; *Bellardia* for *Bartsia*; *Gale* for *Myrica*; *Limodorum* for *Epipactis*; *Orchiastrum* for *Spiranthes*; *Bermudiana* for *Sisyrinchium*; *Vagnera* for *Smilacina*; *Unifolium* for *Maianthemum*; *Disporum* for *Prosartes*; etc., etc.

Prof. Greene apparently in the full belief that only his book will be used hereafter, sedulously refrains from mentioning the well-known equivalents of his adopted genera and we give them for the benefit of any student who may chance to lack a large

library, and be puzzled by the names of that obscure treatise commonly called "The Botany of California."

The species are of course split to the utmost, the most trivial attribute furnishing sufficient cause for resurrecting an old synonym or making a new species. The descriptions, when not compiled, with the more important characters omitted, are descriptions of specimens instead of species; in a very large number of cases so defined—or undefined—that no distinction is shown—the organs mentioned in one diagnosis being omitted from others; often absurd misstatements are made, for example, the "rich brownish red" *Nuphar polysepalum*; the "capsular, circumscissile" fruit of *Garrya*; or *Campanula exigua*, found "only the very summits of the highest mountains, Diablo, Tamalpais, and Hamilton" when in fact it is most abundant at moderate or low elevations, such as the upper end of Mill Valley, perhaps 500 feet; Bolinas Ridge, 1600; and St. Helena just above the toll house — which is only 2300 feet above sea level.

The principle upon which genera are united or divided is past finding out. Bigelovia for instance of which only two species occur in his limits, has them divided between *Ericameria* and *Isocoma*; *Lonicera* separates into *Caprifolium* and *Distegia*; *Hemizonia* into *Calycadenia*, *Blepharizonia* and "Centromadia" a new genus for the *pungens* group; etc.; while he coolly unites *Spirostachys* a genus with flowers borne in the axils of persistent scales, and albuminous seeds with a dorsal nearly straight embryo, into *Salicornia* a genus bearing its flowers in excavations of the joints, seeds without albumen and with conduplicate embryo; and *Eremocarpus* with imbricate sepals and 1-locular ovary into *Croton* which has usually valvate sepals and 3-locular ovary, passing over *Crotonopsis* with nearly the characters of *Eremocarpus*.

Attention has been called in a previous paper\* to Prof. Greene's scanty knowledge of the flora of even his immediate vicinity. In the preface to his book he asks those who may make use of it to furnish a record of additions within its limits. We subjoin a few, which readily occur to us:—*Brasenia peltata*, Bouldin Island; *Wislizenia refracta*, Lathrop to Stockton; *Polygonum Parryi*,

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\* Zoe IV. 68.



Howell Mountain; *Eriogonum fasciculatum*, San Francisco; *Chorizanthe polygonoides*, Tamalpais and Oakland Hills; *Chorizanthe uniaristata* near Livermore; *Lastarriaea Chilensis*, common between Antioch and Mt. Diablo; *Claytonia diffusa*, Mill Valley, Tamalpais; *Elatine Californica*, Suisun and Antioch; *Caulanthus crassicaulis*, near Altamont; *Fremontia Californica* near Wright's in the Santa Cruz Mountains; *Ceanothus rigifolius*, Tamalpais; *Rubus leucodermis*, Sonoma County; *Glinus Cambesidesii*, San Joaquin Bridge; *Cypselea humifusa*, same locality; *Callitriche sepulta*, San Francisco; *Oenothera Californica*, near Antioch; *Oenothera gauraeflora*, near Livermore; *Circea Pacifica*, specimens in Herb. Cal. Acad. marked "Tamalpais" Kellogg; *Crantzia lineata*, Antioch and Martinez; *Ledum glandulosum*, Point Reyes; *Pleuricospora fimbriolata*, near Healdsburg; *Hydrophyllum occidentale*, slopes of Mt. Diablo above Clayton; *Mimulus Congdoni*, near Lagunitas in Marin County; *Mimulus Rattani*, summit of Tamalpais; *Linaria vulgaris* near Valley Ford in Marin County; *Utricularia vulgaris*, near Olema, Bouldin Island, and about the railway trestles of the San Joaquin; *Boschniakia strobilacea*, Tamalpais and Mt. St. Helena; *Lycopus sinuatus*, *Scutellaria galericulata* and *S. lateriflora*, Bouldin Island; *Anemopsis Californica*, Alameda marshes, Collinsville, etc.; *Odontostomum Hartwegi*, near Napa.

There is let us hope no botanist prepared to follow Prof. Greene in his wild hunt through the lexicons, for names, many of which if they could possibly be identified with certainty, would still be only manuscript names. Any date earlier than that of Linnæus involves a prodigious waste of time and long uncertainty, and with the evidence of his writings before us we submit that Prof. Greene's time could be much more usefully spent in taking an elementary course in botany at Harvard or Stanford.

A year or two before his death Dr. Gray dubbed the author "The new Rafinesque." In this he was unjust to Rafinesque who was at once a great egotist, a little mad, and somewhat of a genius. Prof. Greene lacks the genius. K. B.

## NOTES AND NEWS.

Prof. C. Sargent of Harvard, accompanied by Mr. W. M. Canby, are on this Coast, looking at trees for the benefit of the "Silva of North America." They have visited San Diego, San Francisco, Berkeley, Palo Alto, Monterey, etc., and go from here to Santa Barbara, San Bernardino, etc., returning to the East by way of Arizona, where they will make investigations.

JACKSONIA, R. Br. "I am sorry to find that I was in error in supposing (p. 348) that no new name had been substituted for *Jacksonia* R. Br. Prof. E. L. Greene has replaced it by *Piptomeris*, a name under which Turczaninow described a single species referred by Bentham to *Jacksonia*: and proceeds to enumerate thirty-five species under this title. With the aid of the printer he contrives to invent two fresh names: P. 'dilatata' for J. dilatata Benth.; and P. 'purpuascens' for J. purpurascens Muell. It is to be regretted that some more useful or at least less mischievous outlet cannot be found for the superabundant energy of which Prof. Greene seems to be possessed."—JAMES BRITTEN in *Jour. Bot.* xxxi, 274, (December, 1893).

Mr. and Mrs. T. S. Brandegee have taken up permanent residence in San Diego, Calif.: partly for the more agreeable climate and partly to be nearer the chosen field of Mr. Brandegee's botanical labors. They take with them their excellent botanical library, and private herbarium.

Prof. Douglas H. Campbell goes to Europe at the end of the term to spend six months in botanical researches.

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With this number completing the fourth volume, the publication of *Zoe* will cease for the present. For a journal of its age and character it has received good support, and closes with a steadily increasing subscription. It has been, however, too serious a drain upon the time of the editor, and interferes materially with work of more present importance.



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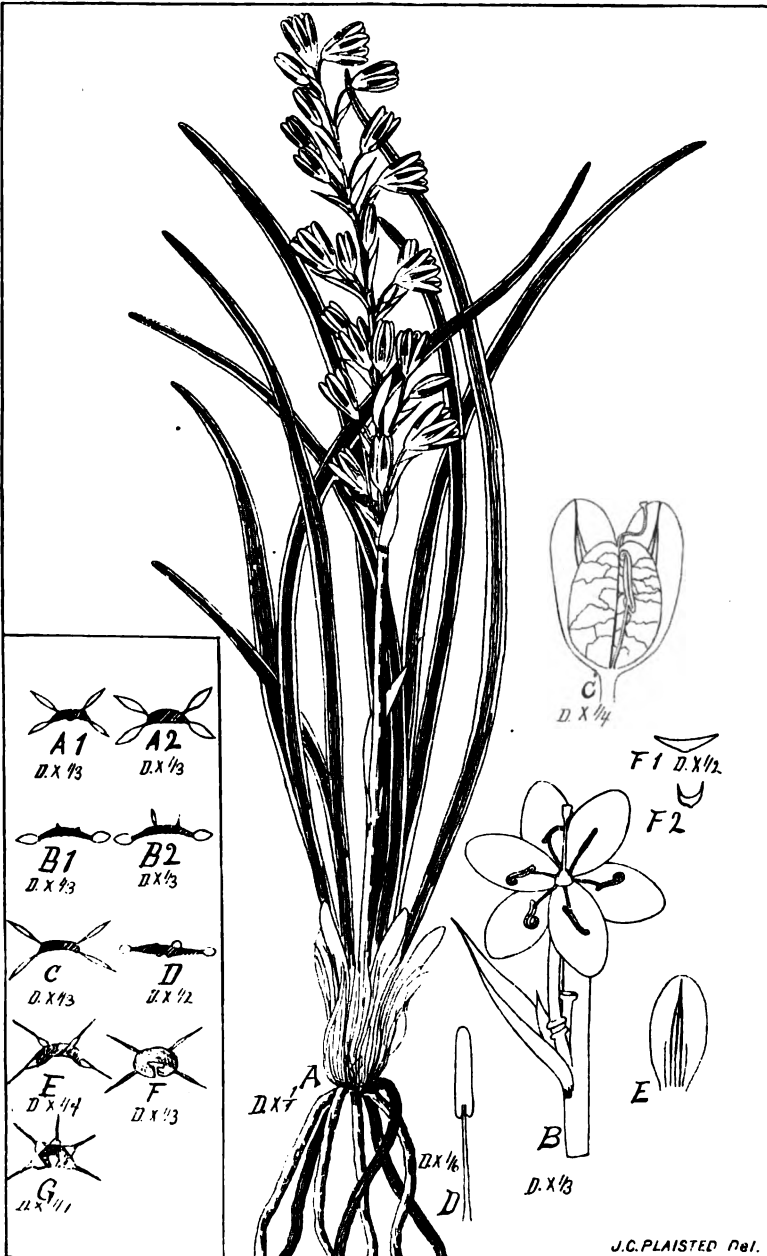
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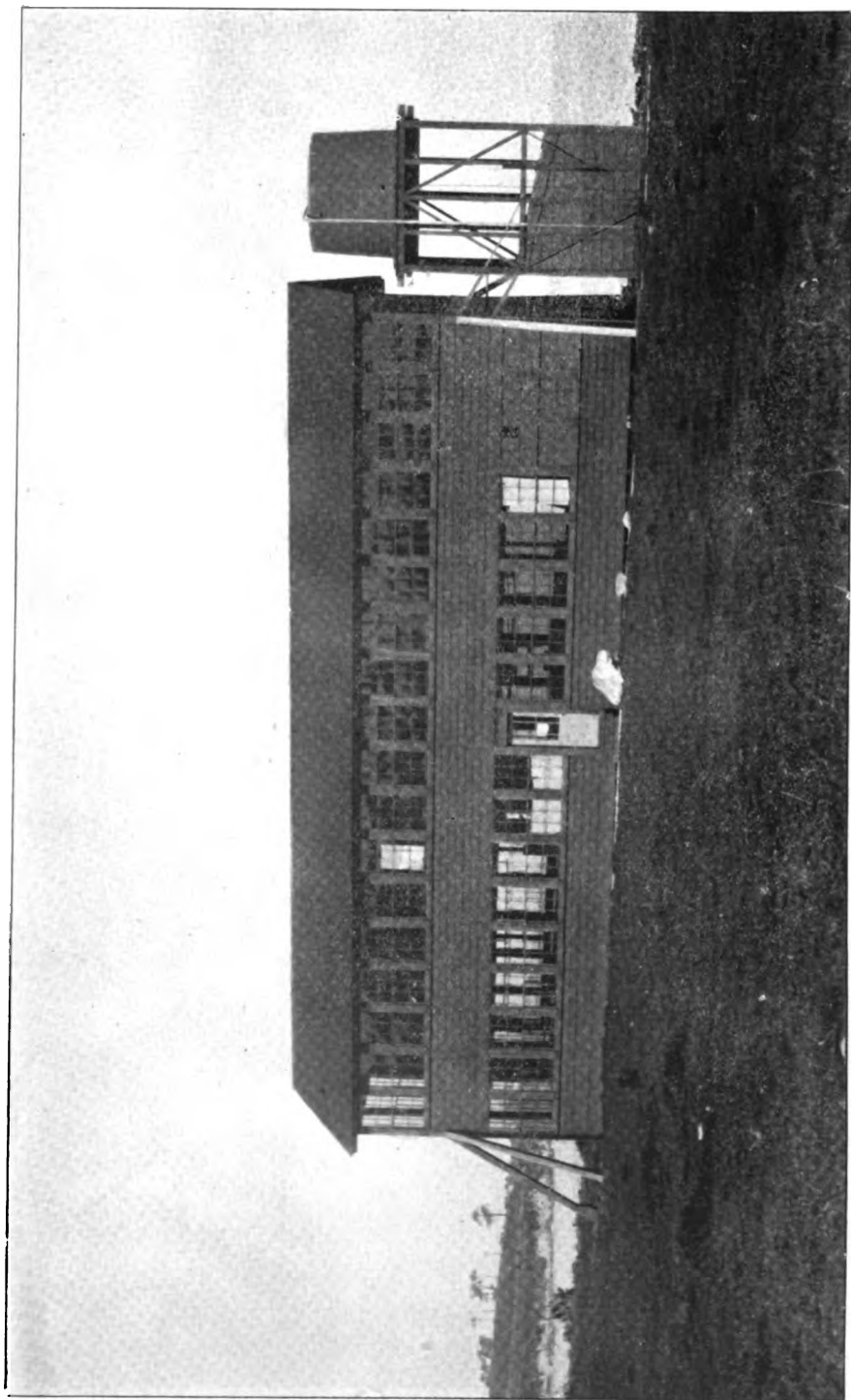


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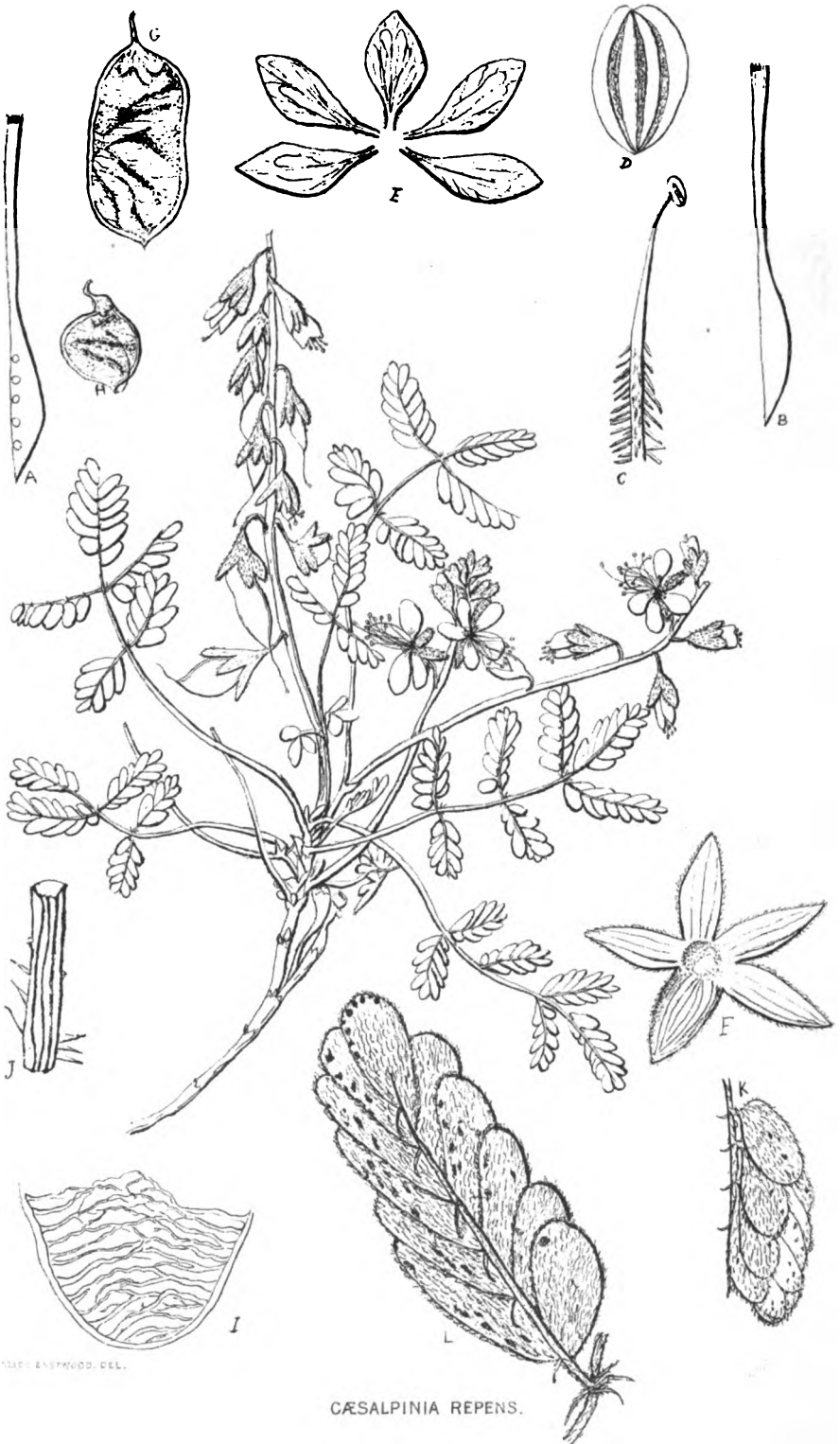




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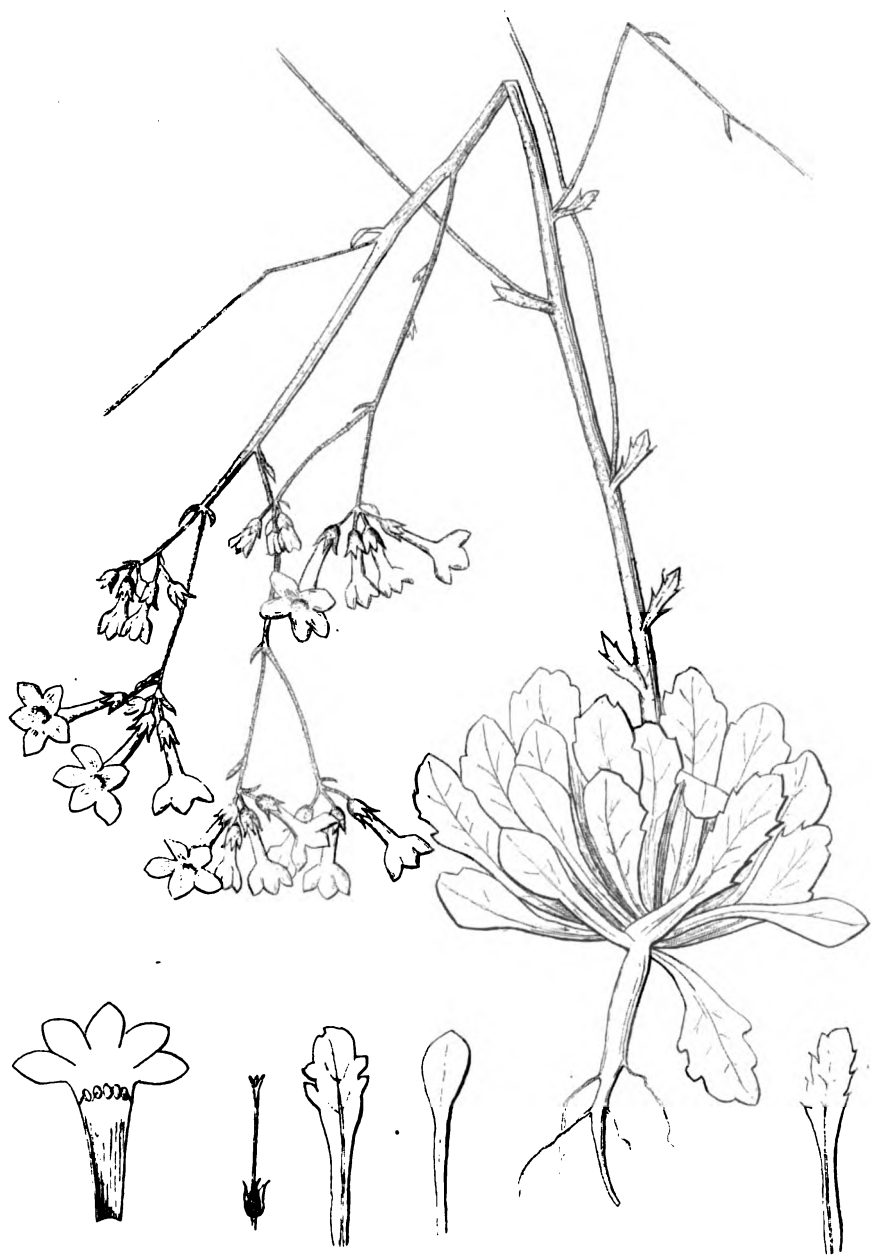






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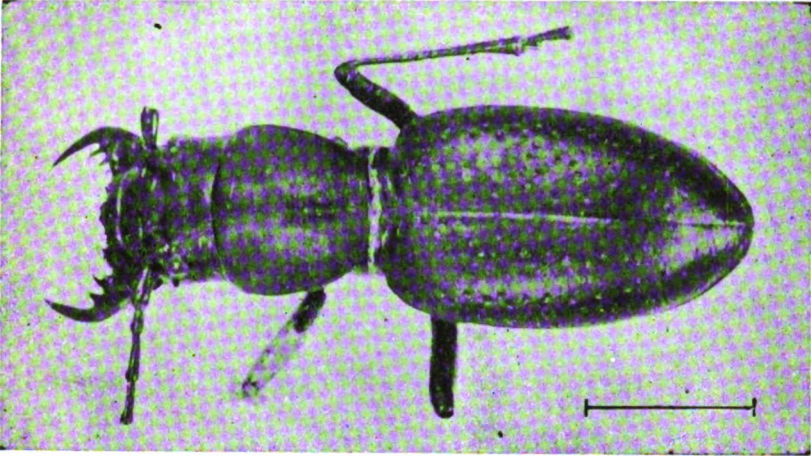
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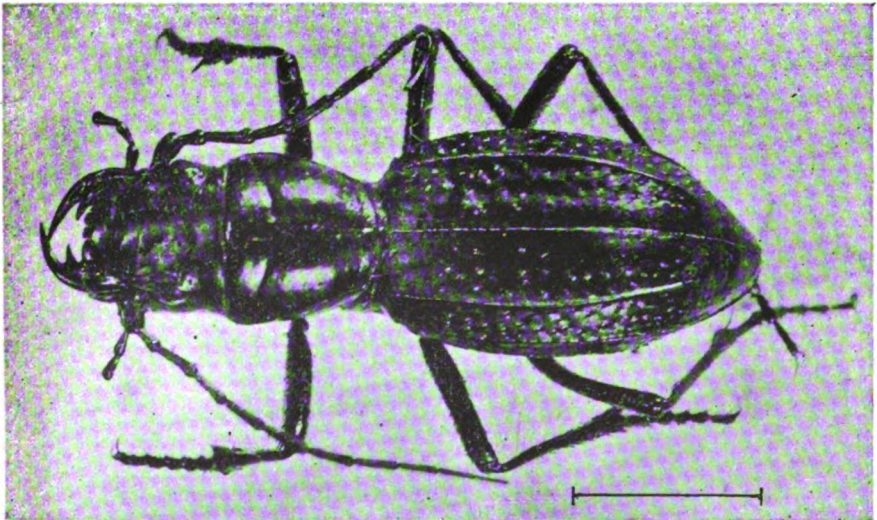


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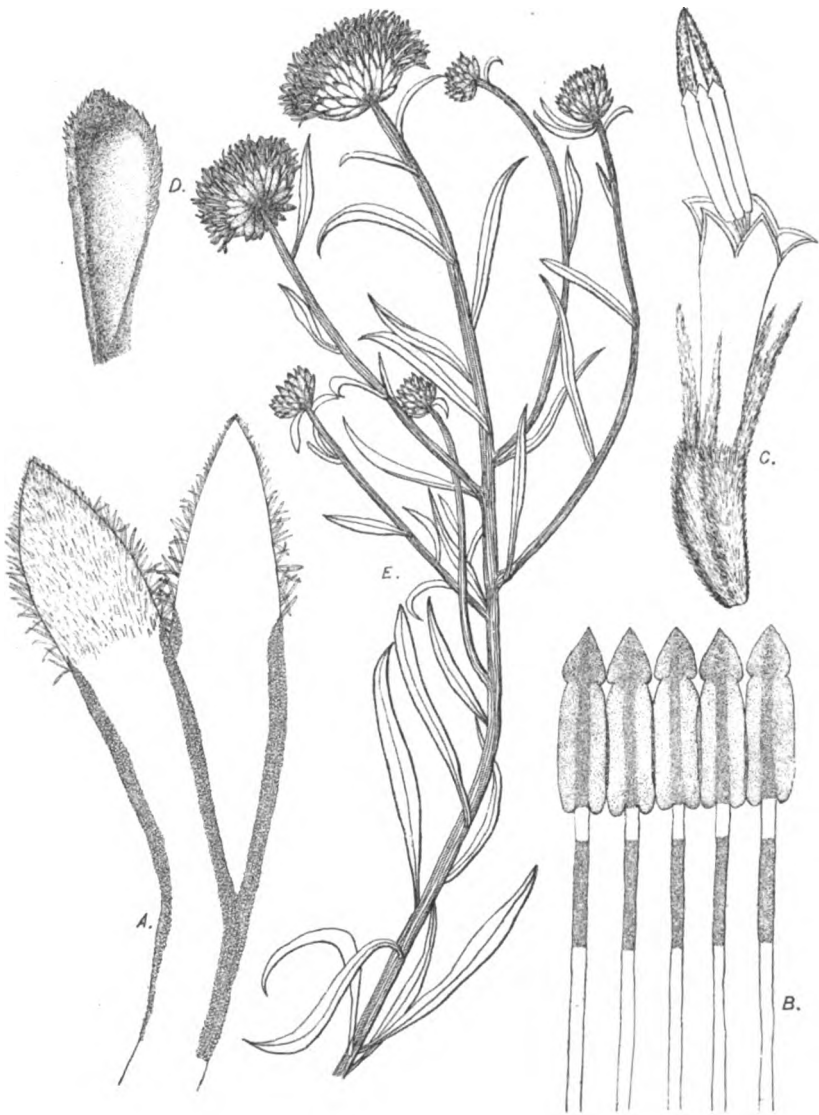
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